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CARPENTRY AND BUILDING

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NOTES AND COMMENTS.

A YEAR ago, in presenting the initial number of a new volume, we briefly considered the outlook in the building business, which at that time was extremely bright and promising. We referred to the good crops of the preceding season, the favorable financial outlook and other conditions which seemed to indicate that the year would be of almost unexampled activity. A little later we called attention to the cloud no bigger than a man's hand which had just appeared above the horizon, and as the months passed on we traced the progress of a storm which greatly impeded the business of the country from one extreme to the other. That storm has passed into history as the "Labor Difficulties of 1886." It served to spoil the early part of the year's trade, and, while unwonted activity in the later months in part made up for the loss, the year cannot be regarded as altogether satisfactory whether viewed from the standpoint of master builder or mechanic.

ANOTHER year opens before us and every one is anxiously forecasting the future. Will the year be prosperous for the building trades or otherwise? We are unable to answer the question. Again the conditions are favorable and the outlook promising. Although there have been some advances in prices of labor and materials, still figures are at a point to make investments in buildings profitable. The general prosperity of the people of certain well-defined districts of the land is almost unprecedented, and within their boundaries numerous dwellings of the cheaper class are likely to be demanded, as well as the stores and churches, and schools and other public edifices which every year are built where the community is enterprising and prosperous as well. In most of the cities rents are high, whatever kind of building is sought, and large operations are likely to be undertaken in many of them to supply the demand. Many of the growing towns of the country are similarly situated. The new South is awakening. The industrial activity of portions of Alabama, Tennessee and Georgia is almost phenomenal, and in those sections of the country great activity in the building business for the new year would seem to be assured. And yet the advancing months may see all this changed. Some cloud may arise to obscure the sunshine of active trade. We do not think that this will be the case, however. We feel confident the year will not be spoiled by labor difficulties. We look for a very large building business to be done throughout the country in 1887. The truth or fallacy of our views will be shown as the months roll along.

A SHORT TIME SINCE Col. Richard T. Auchmuty, founder of the New York Trade Schools, delivered a lecture before the Association of Master Painters and Decorators on "The Relation of Trade Schools to the Mechanical Arts." The lecture explained his opposition to the present very imperfect system of apprenticeship, and pointed out the advantages of trade schools. A boy, he said, should be systematically and thoroughly grounded in the trade he wishes to learn before he is allowed to do any work. This knowledge can be obtained in the trade school—rarely in the shop. Colonel Auchmuty said that each boy should pay for his own instruction, for it taught him independence and reliance upon himself. The speaker entered at length into the question of the "harvesters"—those skilled foreign mechanics who come to America for a certain period in each year, and return to their homes with the money made here—and urged that the education of American youth in skilled work would put a stop to their annual appearance.

THE annual convention of the American Institute of Architects was held in New York a few weeks since. Among numerous subjects which were considered and among various interesting papers which were read and discussed there was none which, for the moment at least, attracted more attention than that of Mr. George A. Frederick, of Baltimore, entitled "The Ethics of Architectural Practice." Mr. Frederick's arraignment of the architectural profession related to competition for business, cutting of prices and processes for ekeing out an income to which architects occasionally resort, and which a high ideal of professional honor would scarcely justify. We have not space to go into details, but the reader knows that the subject discussed is a fruitful one, and one about which builders, if ever called upon to testify, could give evidence that would form very interesting reading. It is creditable to the American Institute of Architects that an investigation was promptly ordered, with the idea of discovering who within its fold have been guilty of unprofessional conduct, and further of establishing a code of ethics to which members of the profession shall conform. Year by year the line is being more closely drawn between professional work and business enterprise so-called. The architect is gradually departing from those features of work which are distinctly business like in character, and holding himself closely to professional work. The builders' sphere is thus enlarged and the old competition between the architect, so-called, and the builder which existed in some cases in the past is gradually disappearing.

A WESTERN contemporary, inspired by the fact that many buildings nowadays fall down from no apparent reason, attempts to explain away the usual verdict of "unknown causes" and show that in a number of instances at least a thorough investigation would reveal the misconstruction responsible for the catastrophe. The first case cited is that of a large paper mill, the collapse of which, we are told, was due to the crystallization of the iron girders, so that "the instant the loads were removed the iron lost the last property of cohesion, a characteristic peculiar to this material, and of course had no more tensile strength than so much fine sand." To accept such an explanation as the true one demands more than ordinary faith. In the first place, it is an open question whether iron is ever crystallized cold, and why the loss of cohesion was due to the removal of the load is a statement most difficult to comprehend. Our contemporary refers to another instance where the trouble was traced to the weakness of a tie-rod, the ends of which had become crystallized by the alternating heating and cooling of the center. A third and even more remarkable case was a large building somewhere in Ohio which had been condemned by the city authorities. An examination, it is stated, revealed the fact that a 2-inch iron rod across the center of the building was responsible for the mischief, it being tight, while the two others, one at each end, were loose. "This rod was immediately over the gas jets, eight in number, and the heat from them had contracted the rod to that extent that the walls were drawn in, and the floors, though covered with machinery, were sprung in all manners of shapes." Here we have the plain statement that a rod was contracted by heating, but the reason for such contraction following the heating of the rod is omitted. The article published in our contemporary contains other strange statements which need not be commented upon. We have noticed some of these "explanations" of the fall of buildings simply to warn our readers against the unconditional acceptance of any such wild theories.

ONE of the most interesting features of New York, to the casual visitor at least, is the numerous tall buildings which have been erected during the past few years. So many of these have been put up in the lower part of the city as to very materially change the appearance of the city when viewed from either Brooklyn, Jersey City or from incoming steamers. The upper part of the city has also been changed in appearance, although not to so great an extent. In the neighborhood of Central Park some very tall apartment-houses have been erected. Several unusually tall buildings are also to be found in other parts of the residence portion of the city. Speaking on the subject of tall buildings in the metropolis the *American Architect* says: "It seems that the law which passed a year or more ago in New York, limiting the hight of dwelling-houses to a maximum of 80 feet from the sidewalk, has, like so many others of the statutes which we pay our legislators for composing, proved a dead letter. It is not settled yet whether it was born dead or died immediately after birth, but it is certain that it never showed any signs of life, and some doctors in the law assert that it never possessed the organs necessary to vitality. According to these learned men the statute neither contained any provision for its own enforcement nor mentioned any penalty for its violation; while, even if it had been fortified by

these weapons, it was plainly unconstitutional, since it undertook to limit men in the enjoyment of their real estate, which, in legal theory, extends from the ground on which its boundaries are drawn to that heaven where titles and taxes have no place; and, moreover, even if it had been originally Constitutional and vigorous, it was repealed immediately after its passage by the passage of the General Building law of 1885, which contains precise provisions for the thickness of walls in dwelling-houses more than 115 feet high, under the rule that a subsequent statute abrogates and repeals all provisions inconsistent with it which may be contained in those previously existing. We have our doubts as to the unconstitutionality of laws restricting the hight of buildings, but our readers will observe that a law which never had any life in it nor possesses any vital parts, and which could not exist, if it had possessed them, in the pure, Constitutional atmosphere of New York, and which, moreover, was killed immediately after it was born, need have no great terror for them, and in practice the people who wish to do so build houses 100 feet high or more with just as much freedom as they did before the statute was passed. Fortunately for the people of New York, the lofty apartment-houses once so popular are coming into disfavor. Their great cost as compared with that of humbler structures made them doubtful investments in any but the most fashionable locations, and the infirmities of construction which some of those more carelessly or ignorantly designed have displayed perhaps cast discredit on the rest, so that a 12 or 15 story flat in a second-rate situation in New York is just now not a very desirable piece of property to own, and it will be many years before the fever for building them comes on again.

IT WOULD seem that St. Louis is afflicted with business blocks which have so little strength as to warrant the term "Buddenseik buildings." A few months since the building occupied by the Simmons Hardware Company fell in, resulting in a very considerable loss. A few weeks since, another hardware building collapsed in the same general manner. The first accident, we believe, was attended by no loss of life, but in the last instance three men were buried in the ruins. The loss of property is estimated at $600,000. The building seems to have been heavily loaded in each story, and it was supposed that the superadded snow on the roof was the last straw that overcame its powers of resistance. Evidently buildings in St. Louis are not as strong as they should be, or else floors are loaded in a way which is dangerous to the community at large. Proper building inspection, it would seem, should avoid such dangers as these.

A CORRESPONDENT of one of the daily papers, writing about shingles, as they were laid 115 years ago, refers to the covering of the steeple of the Unitarian church in Brookline as follows: "One of the first pastors of the church nailed them with big-headed wrought-iron nails to the steeple in 1771, and under them Gen. Israel Putnam often has sat and listened to the discourses—rare in these days—giving liberal interpretations of the Scriptures. It is stated also that the shingles were 'rived' by men who afterward fought with Old Put at Bunker Hill. The shingles are remarkably well preserved. Four of them are displayed in the street windows of the *News* office, in this village, and above them is a placard with this reading: 'These shingles were in use on the Unitarian church in Brookline 115 years. Just look at the nails.' The nails are fine specimens of old-fashioned, painstaking workmanship. They are smooth and round, with large, thin, perfect heads, and are as clean and bright as at the time they were driven into the steeple. They would be considered to-day too valuable to use in any except the most elaborate and costly work. The shingles, which are of red cedar, are not at all decayed."

THE Executive Earthquake Relief Committee of Charleston, S. C., have presented their preliminary report to the City Council. It reviews the disaster of August 31, and gives a general statement of the amount of money contributed to the relief of the city, besides showing how the funds have been distributed. The whole amount of contributions received by the committee is $634,258, but the total fund, including what was distributed through private channels, is estimated at $815,000. Of the former sum the largest contribution came from New York State, which is credited with giving over $180,000, New York City alone contributing nearly $153,000. The next largest donation came from Massachusetts, which gave about $100,000, while Arkansas ends the list with a gift of $6. Among the foreign contributors England ranks far ahead, with nearly $16,000, followed by Germany with $1600, and the city of Shanghai alone gave $500. The unexpended balance in the hands of the Relief Committee amounts to about $186,000, of which $86,000 will be reserved for completing the work of relief, the committee recommending that the remaining $100,000 be deposited to aid in rebuilding the City Hospital and other charitable institutions.

AT THE TIME when the labor agitation in this country was on the wane we suggested that some of the causes leading to it might produce a similar effect in England. There now, as with us then, the indications of an improvement in business are being given undue publicity, because the more sanguine element is considerably exaggerating what has already been achieved. The fact that they are anticipating the future is not thoroughly understood by employers, who confound what may possibly be with what actually is. We argued at the time that the demand for that part of our raw material which we could not promptly supply would check the downward tendency abroad and lead to a stiffening of values. If exaggerated this might bring about a demand for higher wages in England out of pro portion to the better prices for product. In some of the leading branches of the iron and steel trades of Great Britain the relations of employers and employees are such that there is little danger of a contest. In others, and in some collateral industries, the outlook is less satisfactory. This is notably the case in some of the coal districts, and indirectly, therefore, a restriction of output may be partially forced should the men be unreasonable.

THE PLATES.

In Plates I, II and III, we present a comparative study in designing a moderate priced house, by two architects located in parts of the country remote from each other. One design is by Eugene Rice, of Denver, Col., and the other by W. B. Nourse, of Worcester, Mass. These designs are described elsewhere in this issue. In Plate IV we present a design of a mantel, with details of construction, by Howard P. Miller, of Philadelphia, Pa. The scale of the mantel drawings is as follows: The elevation and section, ½ inch to the foot; the details, 4 inches to the foot.

Chimney Construction.

BY C. POWELL KARR, C. E., CONSULTING ARCHITECT.

(Continued from page 229, December issue.)

Miscellaneous.—A malleable-iron cramp coated with tar and sanded is to fasten the ornamental corner brick by anchorage, as shown in the detail drawings. Ladder rungs are to be provided every 12 inches apart vertically on the interior of the chimney, cornerwise, as indicated. Bolts, nuts and washers for fastening the sheet piling to wales shall be 6 inches from beneath the head to the tip, ⅜ inch in diameter, and each bolt provided with two washers 1 inch in diameter. The contractor must do all the work undertaken by him in a thoroughly workmanlike manner, in accordance with the true intent of these specifications and drawings and satisfactory to the architect.

Alterations in the design are not to vitiate the contract, but all extra or omitted or altered work is to be measured and estimated according to a schedule of prices previously agreed upon. The architect is to have the power to reject all improper materials, defective or scamped work, and to have full control over the execution of the work, and free access at any time to the work during construction.

All alterations from the specifications or additions shall be made out by written orders and shall become an integral part of the contract, the builder to have the right to refuse to execute any additional work or alterations from the contract work unless accompanied by an order and specified instructions in writing from the architect.

REFERENCE TABLE OF DIMENSIONS.—HIGHTS.

Total hight, including footing course.	74′ 6″
Hight from top of footing	72′ 6″
From ground line	66′ 6″
From top of grate-bars	65′ 0″
First offset above ground line	20′ 0″
Second offset above ground line	40′ 0″
Beginning of prismatic section above ground line	60′ 0″
First ornamental string course above ground line	47′ 0″
Second ornamental string course above ground line	49′ 0″
Third ornamental string course above ground line	60′ 0″
Chapter alone, including coping and third string course	6′ 6″

HORIZONTAL MEASUREMENTS.

Excavation, 12′ deep by	12′ 0″	square
Concrete, 2′ deep by	11′ 0″	square
Cross section of stack at ground line	8′ 0″	square
Outside cross-section at first retreat	7′ 0″	square
Outside cross-section at second retreat	6′ 0″	square
Outside cross-section at third retreat	5′ 0″	square
Outside cross-section at coping	4′ 4″	square
Inside cross-section at ground line	3′ 9″	square
Inside cross section at first retreat first section	3′ 3″	square
Inside cross-section at first retreat second section	3′ 7½″	square
Inside cross-section at second retreat second section.	3′ 1½″	square
Inside cross-section at second retreat third section..	3′ 3½″	square
Inside cross-section at third retreat third section	2′ 9″	square

CHAPTER.

Outside measurement of base of chapter	5′ 0″	square
Inside measurement of flue.	2′ 9″	square
First offset outside measurement	5′ 4″	square
Second offset outside measurement	5′ 8″	square
Third offset outside measurement	6′ 0″	square
First recession outside measurement	5′ 10″	square
Second recession outside measurement	5′ 4″	square
Third recession outside measurement	4′ 10″	square

Coping depth	0′	6″	square
Coping flue measurement	2′	9″	square

Estimate of Cost.

Excavation, 64 cubic yards at 30 cents	$19.20	
Sheet piling, 1800 feet board measure furnished and placed at $30	54.00	
Fifty bolts, nuts and washers for wales (6 x ¾ inches)	6.80	
Fifty feet board measure oak wales (3 x 2 inches, spliced joints) at $75 per 1000	8.75	
Gravel filling, 22 cubic yards at $1.50	33.00	
Concrete footing, 9 cubic yards at $6.50	58.50	
Brickwork in American cement mortar, 14.3 cubic yards at $12.	$171.60	
Total for foundations		$346.85
43,000 North River brick at $9 per 1000	387.00	
3900 No. 2 fire-brick (Jersey) at $25 per 1000	97.50	
200 special brick, as per designs, at 2½ cents each	5.00	
Bricklaying, $4.65 per day	186.00	
Coping stone	12.50	
Scaffolding, ladder, paving, clamp and sundries	70.00	
For work above ground, total		758.00
Total estimated cost		$1,104.85

These test pits should be about 6 feet apart. Compare the cores from the different pits and thus learn the nature of the ground beneath your foundations. If the soil proves to be of a soft and yielding character it will be advisible to sink the pits some 20 or 30 feet below the depth of the proposed foundations, to ascertain if the soft soil is only a surface deposit or is an alluvial strata, likely to go to a considerable depth. Should the surface indicate a firm, substantial soil, such as gravel or good loam, it would be wise to make an examination to a depth of at least 10 feet below foundation level, in order to know whether the surface soil is a fair indication of what is below. If the soil is a damp clay more precautions will have to be taken to insure safety. Clay soils absorb a large amount of water, and hold it for a much longer period than gravel or loam, and when clay is wet it has a tendency to expand and to press out in every direction; therefore, if a pit be excavated in a damp clay soil it will be found by examinatian that after standing, say, 12 hours, the walls of the pit that were

that sufficient room should be allowed for the clay to expand without causing undue pressure upon the chimney base.

There are many conditions and circumstances we cannot consider here, but where any unusual difficulties occur it will be best to consult an engineer fitted by training and experience to give an opinion. The excavation made, it is then necessary to decide what shall be used for the foundations. In a dry, strong soil where the natural drainage is good, concrete can be dispensed with, and the brick footings begun at once, either upon a good sand bottom protected from spreading by steel piles driven close together or broken stone laid to a depth of 2 feet, well rammed so as to be compact. In no case use plank to lay brick upon unless the plank have been thoroughly creosoted or are in such a situation that they will be wet constantly. For a very high chimney we should commence laying the brick by marking out a series of footing courses racking back by 1 inch or 2 inches to each course or pair of courses on a face, so as gradually to distribute the chimney's

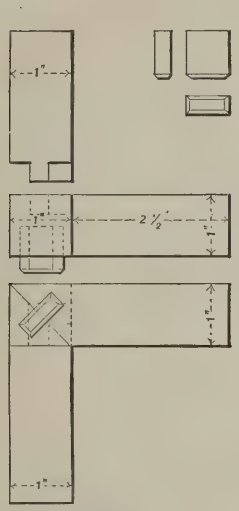


Fig. 22.

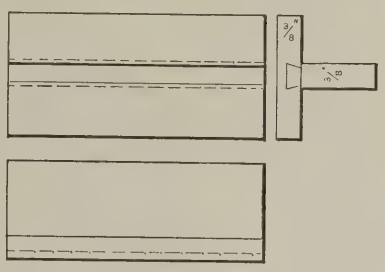


Fig. 24.

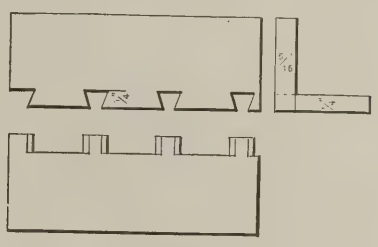


Fig. 27.

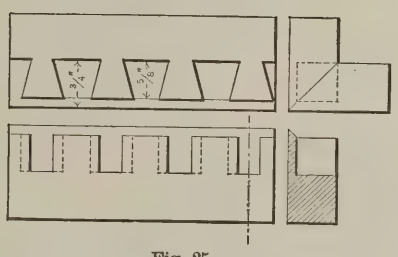


Fig. 25.

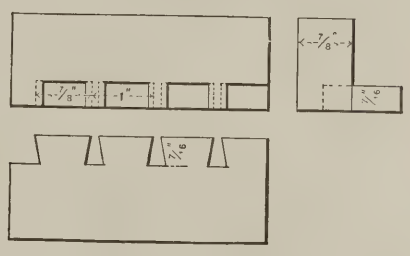


Fig. 28.

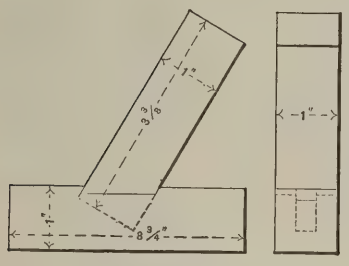


Fig. 23.

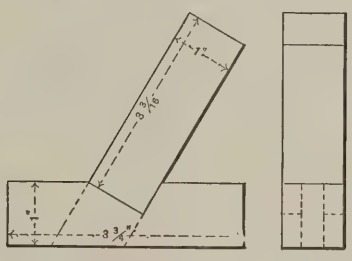


Fig. 26.

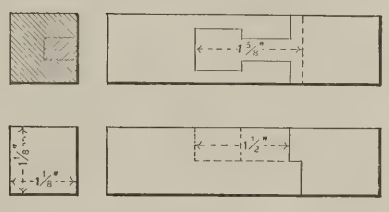


Fig. 29.

Wood-Working Course in Sibley College.—Diagrams Illustrating Some of the Exercises.

MISCELLANEOUS.

Bolts for wales, 6″ x ⅜″; washers for same, 1″ diameter; hole, $\frac{7}{16}$″ diameter. No. 14 wire gauge. Cramps for special brick, 8″ x 1″ x $\frac{1}{16}$″.

Ladder rungs, bends at each end 6 inches; distance between bends, 1 foot; cross-section transverse, ¾ inch square. Hoop-iron bands, 1 inch wide, $\frac{1}{16}$ inch thick. Lengths variable as the cross-section where used, if used at all.

GENERAL REMARKS, METHODS AND CONCLUSIONS.

In the first place, make an examination of the ground upon which the chimney is to be built by sinking test pits. These can be sunk in loam, clay or non-shifting sand by a screw auger, which can be formed by any blacksmith out of a 1-inch square bar of iron into a corkscrew shape, about 2 feet long, with six complete turns, 6 inches in diameter, its lower end sharpened to form a vertical cutting edge, which should project about ½ inch beyond the spiral of the screw. It will bring up in its turns cores of earth. It will need a small derrick for deep drilling.

left vertical are now no longer plumb—the walls, in fact, have shown a decided tendency to bulge and to press outward toward the pit. Now, by whatever force this bulging may be caused, by just such a force would it press upon the foundations of the chimney. If this pressure for any reason be unequally distributed it would exert an injurious effect upon the masonry; this effect, if continued, might in time become a disaster. In such a case it would be best to overcome a great force by a number of smaller, but subtler, forces, namely, the forces of capillary attraction. This is done by a filling of cinders—soft-coal cinders are the best, which by their porous character act as a sort of sponge to draw from the surrounding clay its moisture, which can be gathered by drainage and carried away. A large part of the cinder bed will give up its load of moisture to the air by evaporation. It would also be good practice to enlarge the area of the excavation to a greater extent than called for in the accompanying specifications. This will secure a wider distribution of the load of the chimney by having a broader base. It must be borne in mind

load upon as broad a base as possible. Cut stone "joint faced" upon its lower and upper beds, of varying thicknesses, are sometimes laid in these lower courses to more thoroughly bond the brick together horizontally, and to aid in the distribution of the load. In a chimney stretcher courses should preponderate in order to guard against the prevailing weakness of chimneys, viz., vertical seams.

(To be continued.)

Wood-Working Course in Sibley College.

In our last issue we gave a brief account of the wood-working course in Sibley College, Cornell University, Ithaca, N. Y. On this page we present additional cuts illustrating exercises from the course. In a future issue we expect to present the course in wood turning. These illustrations are of interest to wood-workers in general and apprentices in particular, since they point out in a very satisfactory manner the principles underlying construction, and indicate

the exercises which are of advantage in making the student familiar with a wood-working trade.

Designs for Carvers.

One of our English exchanges devoted to the furniture trade presented in a recent issue some interesting remarks on the general subject of carving, with special reference to the adaptation of natural forms. The general title given to the article was, "Our Carver at Kew." The scheme of the article was to take up different plant forms, both exotic and indigenous, and to show how they could be readily conventionalized and designs produced from them which would have a commercial value. We have re-engraved a number of the illustrations employed in this article, and present them herewith. We have also had engraved

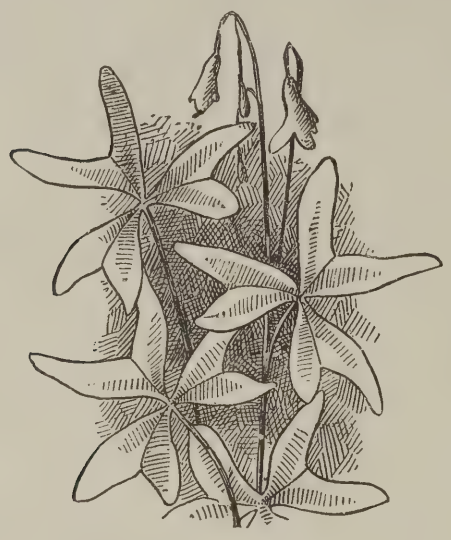


Fig. 1.

Fig. 2.

Fig. 3.

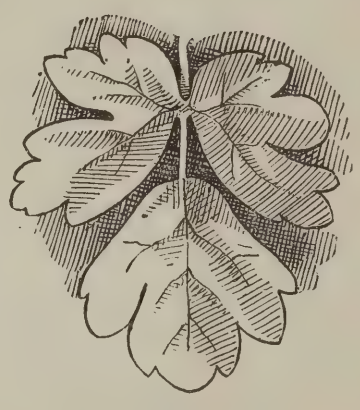


Fig. 4.

Fig. 5.

Plant Forms from the Botanical Gardens at Kew, Suggesting Designs for Wood Carvers.

three of the panels, which were introduced to show how the intelligent carver could employ and conventionalize the forms to which reference was made. Our idea at the outset in the preparation of this article was to paraphraze it, and to put it into shape to be more particularly interesting to American readers, but further examination of it has convinced us that the best we can do is to present it entire, prefacing it by these introductory remarks, which indicate its origin and purpose. It forms a very appropriate supplement to other articles on this same subject which have appeared in these pages in the past. We do not attempt to name the different plant forms which are employed in this case. Some of them are perhaps unknown to our readers, while others are so familiar as to be recognized at sight. The article referred to is as follows:

The natural basis of all conventional ornament must be obvious to every intelligent carver or designer. As Ruskin truly says, "all beauty is founded on the laws of natural forms," and "that is most natural which is most easily and ordinarily seen." Of this "natural" basis the beautiful acanthus leaf presents itself at once to the mind as a suitable and striking illustration. It is not, however, by any means the only illustration of this relationship. Very little reflection will suffice to show that the designer's dependence upon nature is complete, and that no one can wander far from it without producing an obvious absurdity. He is reduced to the necessity of learning at the school of nature or at the feet of those who have studied there. Doubtless he does best who does both and does them diligently and humbly. It must not be supposed that we are recommending a slavish imitation of nature, evolved with infinite pains. This may be right for the realistic painter, but certainly is not for the carver. Nature must be his teacher, guide or inspirer—not his master. He must learn by practice to suitably apply the ideas acquired in its school, and adapt and vary natural forms as imagination, properly guided, may direct. The want of this study of nature is largely responsible for the cramped, stiff and "lifeless" tendency of style observable in the work of many carvers, who are evidently capable of better things if they would only take the trouble to search for themselves. Let those who would avoid the usual commonplaces and acquire vigor of style with freshness and fertility of ideas become diligent and humble students in the school of Dame Nature. And here we may remark how abundant are the materials for profitable study. No one, for instance, with an observant eye capable of appreciating the beautiful can walk by the hedgerow in the summer time and not be struck with the almost endless variety of exquisite leaf forms that invite his attention and compel his admiration.

There are few in these days of ever-increasing railway facilities to whom the country is not at some time accessible, but even these may take comfort in the fact that the humblest garden, or occasionally even a grass plot, will furnish objects of interest which may be studied with advantage. Indeed, some of the humblest plants or even weeds will prove more suitable to the wood carver than many plants with gorgeous flowers and sweetest scent, for he has in his work to rely not upon color, but form. We have no intention in these chapters to go over ground already well covered. Our hope is that we may be able to place before our readers some leaf forms which, while they are amenable to the tool of the carver or suitable for decorative purposes generally, have at the same time the merit of being more or less uncommon. The grape leaf, the leaves of the hop, currant, oak, laurel, chrysanthemum, rose and others too numerous to mention here are all familiar. The field, meadow, hedgerow, garden, have all been explored so thoroughly in the interests of the designer that there is no need to take our readers to make a survey of their riches. And for the same reason one can hardly hope to find in these sources anything at all new to the majority of our carvers, for whom more especially these notes and sketches are intended.

Fortunately for the object before us, the field of nature is a very wide one—not subject to the geographical limits of one or two islands. At the same time, we may congratulate ourselves that it is not necessary to leave our island home in order to become acquainted with plants, flowers and trees which are foreign to it. Nature's floral kingdom has been searched on our behalf in every part of the world, and we have large results of that search brought together in the Royal Botanical Gardens at Kew. Of all places likely to furnish suggestive and uncommon forms of leaf or flower, none probably can compare with these gardens. The provincial carver or designer might

well envy his London brethren their facilities for visiting this lovely place. One could wish, by the way, it were more generally visited and widely appreciated, especially by the artisan class, who seem, even on the Saturday half-holiday, conspicuous by their absence. To the carver who loves his vocation, and all who can appreciate the beauti ful, there is always a feast. It would be foreign to our purpose to attempt anything like a description of these gardens. If we did, the reader who should afterward visit them would probably exclaim, "The half was not told me;" and, indeed, those who would realize their splendor must visit them. We will therefore pass by the palm "palace," with its wonderful palms and tropical ferns, and the conservatories, with their long perspective of glowing color, and at once step into the rock garden, a comparatively recent addition to its attractions. Before, however, we examine its riches at all minutely we are constrained to look around and admire the arrangement. On each side of a winding path, which has been sunk about 4 feet, stone and tree roots, large and small, have been freely tumbled or piled up in delightful confusion. They are made to rise more or less gradually, or perhaps it is seen that the most distant parts of the world send contributions. The accompanying sketches of various leaf forms, all of which are taken from this garden, will furnish proof of this, and will, we think, be found sufficient in point of detail for the purpose we have in view. Thinking that the botanical name may be of interest to some of our readers, we have noted it in those instances where we have seen it appended to the plant. Fig. 4 shows a leaf which will at once commend itself as providing some material for a bold composition. The surface of the leaf is not veined, but smooth; the carver may, however, bend it according to his fancy. Deep cutting will give a very effective shadow in the narrow space between the parts into which the leaf is divided. Figs. 6 and 10 show two somewhat remarkable leaves, the full grown leaf in one case (Fig. 10) almost succeeding in filling a circle, and in the other, quite as successfully, a half-circle. Repeated in a molding, and in semicircular divisions, this latter leaf would seem quite at home and have a pleasing effect. The younger leaves of this plant have a more sprightly appearance than their mature companions and admit of freer treatment. Like those of that sharp, clean cutting which is the charm of good wood-carving, while the spaces between the leaves, especially in the Peruvian plant, provide for telling bits of shadow.

(To be continued.)

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Plant Forms from the Botanical Gardens at Kew, Suggesting Designs for Wood Carvers.

we should say abruptly, to the hight of several feet. Immediately beyond, and on either side, tall trees rise, affording friendly shelter from inclement weather and completing the valley-like aspect. Here ferns and all such plants as delight in a scanty soil or thrive upon stones with apparently no soil at all are seen in astonishing variety and bearing every token of constant and scrupulous care. Every inch of space on stone or tree stump seems to be sought by one or other of these plants, some of them of the minutest description.

Some parts of this retreat seem to border on the romantic. For instance, one hears the sound of water falling—nothing, however, to suggest, except by extreme contrast, the thunder of a Niagara—but a musical dropping which is in perfect accord with the quiet surroundings and the little nook in which it is discovered. After falling, the shallow water lingers lovelingly around, as if reluctant to leave the tiny plants which cling to the stones over which it passes, while the leaves of others are borne tenderly by it upon its bosom.

Although flowers are by no means scarce here, non-flowering plants prevail, and the expectation that some uncommon forms of leaf suitable for carving or other decorative purposes may be found is not disappointed. This will not be surprising when in Fig. 10—which, by the way, seem to possess a family likeness—they are drawn in toward the stem, a circumstance of which the carver will not be slow to perceive the value.

Rubus arcticus (Fig. 2), though possessing some points of resemblance to leaves with which the designer is familiar, has also some points of difference which may make it worthy of his notice. It would contribute to a lively and vigorous design. Fig. 11, like Fig. 7, shows three leaves so arranged as to form one, although the division in this instance is more marked. It is given less because of its value to the carver than because of its curious shape. Each of the three parts into which the leaf is divided seems as if it had been first shortened to destroy its oval form and then the edge notched. The cotoneaster (Fig. 5) is a very large leaf, with numerous subdivisions, of which our sketch is simply one. In the flat its form is symmetrical, and the little smooth-faced leaves which make up the larger ones are chiefly noticeable on account of their quaint outline. The *oxalis elegans*, of Peru, like its sprightly neighbor and relative, *oxalis vespertitionis*, of Mexico, seems to invite the carver's tool. The clean, vigorous outline, the deep and shaded depression in the middle of each division of the leaf, afford a capital opportunity for the display

Absolute and Relative Strength of Timber.

In writing upon this subject Mr. Cowie says:

In ascertaining the strength of timber two points must be kept quite distinct, viz., the constant expressing the relative strength and the constant to be used in the formulæ, such as those given in Turnbull, which we may call the constant representing the absolute strength. If a hundred experiments are made on a particular kind of fir, the breaking weight in each case being taken under exactly similar circumstances, the one-hundredth part of the sum of all these weights represents fairly enough the mean strength of that particular wood—*i e*, it will do to compare with a number determined in the same way for another kind of fir, and, the greater this mean weight is, the stronger the wood. So far, then, as scientific research is concerned, this method is fair; but the same constant will not do for the practical man. I say that for this we must take the least weight that broke the beam, and not the mean; for the workman wants to know not what the average strength of the wood is, but how much he may trust to a particular specimen of it; and therefore he wants to know what is the least weight that broke a fair, uniform, sound beam under given circumstances. The first set of constants will guide him in the choice of his material, but if he begins to calculate the dimensions from the formula, as in Turnbull, he wants a different constant, viz., the one I have above pointed out. My attention was drawn to this subject by reading the following passage in Professor Barlow's book on "Strength of Materials," page 26:

"Since the strength of direct cohesion must necessarily be proportional to the number of fibers or to the area of the section, it follows that the strength of any iron rod will be found by multiplying the number of square inches in its section by the corresponding tabular number as given above. This, however, gives the absolute strength, or rather the weight, that would destroy the bar; and practical men assert that not more than one-fourth of this ought to be employed. I have,

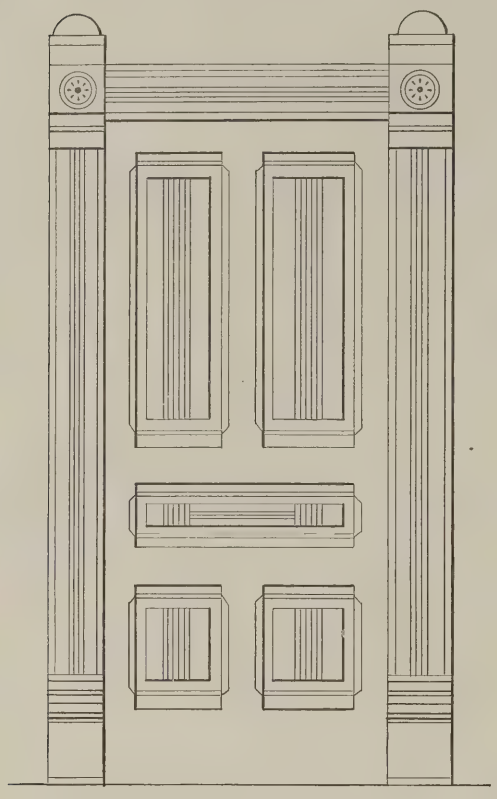
however, left more than three-fourths of the whole weight hanging for 24 or 48 hours without perceiving the least change in the state of the fibers or any diminution of their ultimate strength."

It will be seen that Professor Barlow uses the expression "absolute strength" in the way in which I have proposed to use "relative strength." I say that, if he proposed the smallest weight instead of the mean, the result would be one which practical men ought to trust. As to the arbitrary "one-fourth," it only shows that we have not yet succeeded in proving to practical men that we can do them any good, and Mr. Barlow justly intimates that there is a great sacrifice of the powers of the material in this very arbitrary reduction.

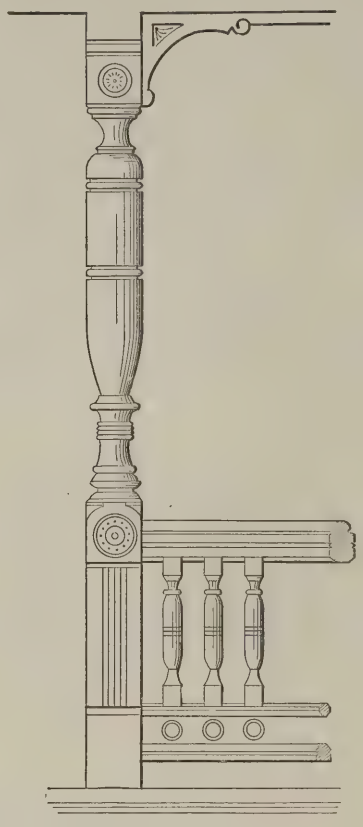
Studies in House Designing.

It has always been of interest to the readers of *Carpentry and Building* to have plans and designs submitted for their examination which are founded upon the same idea or are produced under like conditions. Some of the most successful competitions that we have conducted have been based upon such a scheme. Given certain requirements with reference to a house as the prime conditions, the resulting plans, coming from architects in different parts of the country, have always been of unusual interest to our subscribers. On the other hand, given a certain floor plan and required the elevations of the building, the comparisons that can be instituted in the efforts submitted have always been profitable to all classes of our readers. It is something of the latter nature that we present by means of the illustrations shown in Plates I, II and III, and also by the details distributed through our letter-press pages. The floor plans employed are those which formed the basis of the Eleventh Competition in *Carpentry and Building*. One of the designs comes from the West and the other comes from the old Bay State. Both represent inexpensive frame houses, but the interpretations of the design, character of finish employed, and other elements, are sufficiently in contrast to form an interesting study.

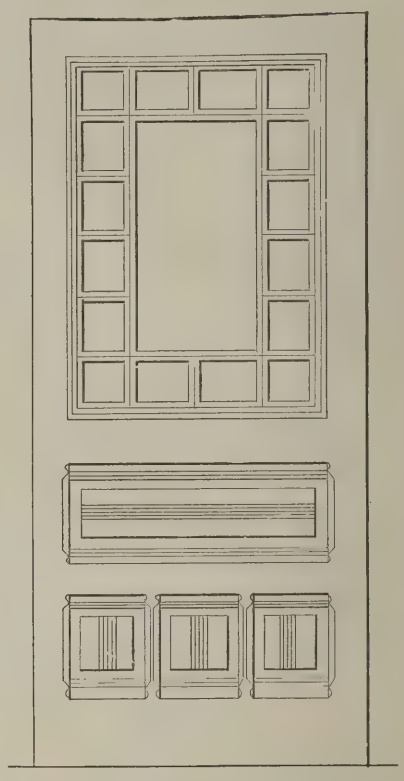
Mr. Eugene Rice, of Denver, Col., the author of one of the designs, in speaking of it, says: "The house has been designed in



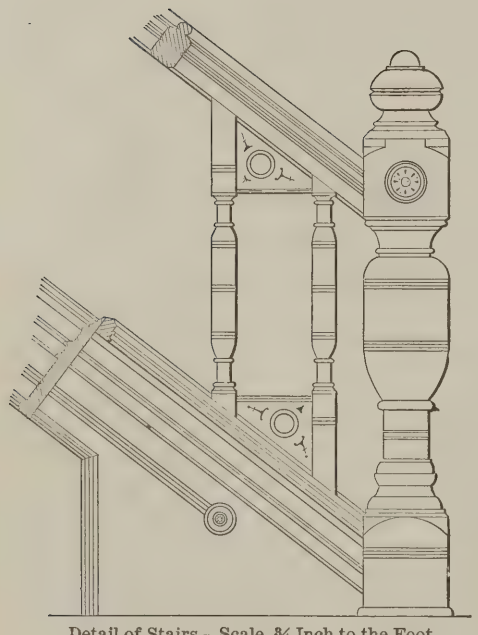
Side Door.—Scale, ½ Inch to the Foot.



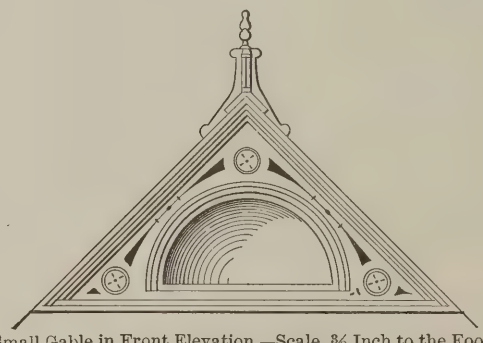
Detail of Veranda.—Scale, ½ Inch to the Foot.



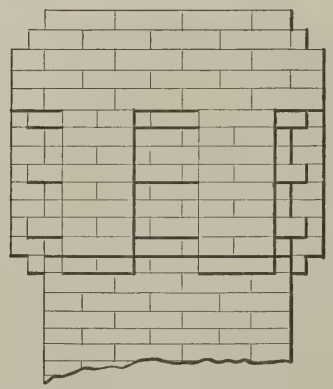
Front Door.—Scale, ½ Inch to the Foot.



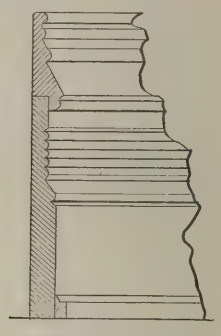
Detail of Stairs.—Scale, ¾ Inch to the Foot.



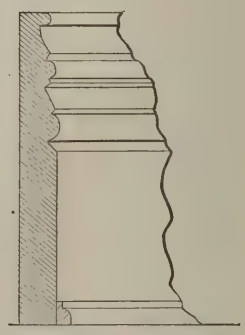
Small Gable in Front Elevation.—Scale, ⅜ Inch to the Foot.



Chimney Top.—Scale, ½ Inch to the Foot.



Detail of Baseboard.—Scale, 1½ Inches to the Foot.

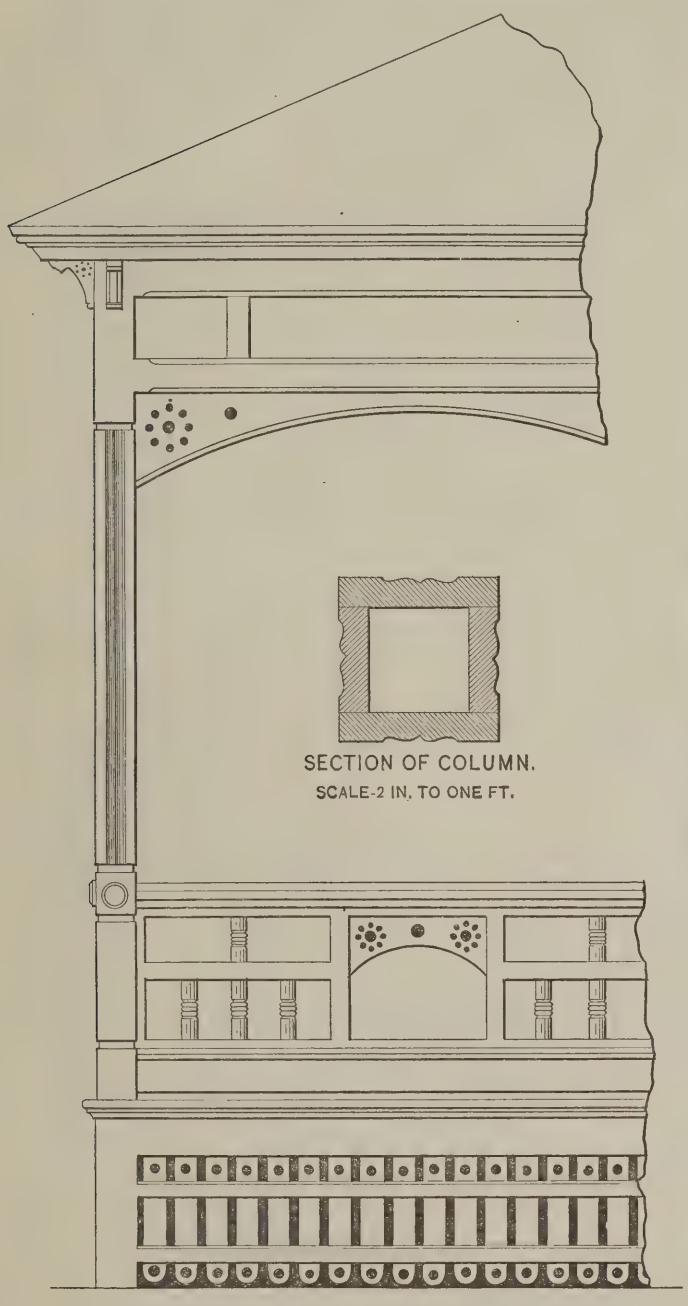


Plinth of Doors.—Scale, 1½ Inches to the Foot.

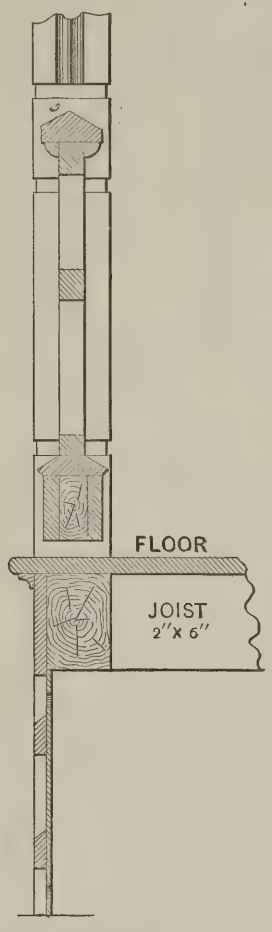
Details of House Design by Eugene Rice, Denver, Col. (*For the Perspective and Elevations, See Plates.*)

neat and tasteful, but comparatively inexpensive, manner. The rooms are low, as becomes a cheap house, the ceilings being 9 feet 6 inches for the first story and 8 feet 6 inches for the second story. The exterior walls of the second story are to be covered with shingles, as also the space between the first-story window sills and the water table. The remaining space is to be clapboarded. The underpinning is to be of stone, laid rock-face and pointed with red joints. The chimneys are to be of stock brick laid in black mortar. The interior finish is intended to be of pine, painted. The stair newel, rail, &c., are to be of cherry. The roof will be covered with shingles and painted black slate color. The gables are to be filled in with cut shingles."

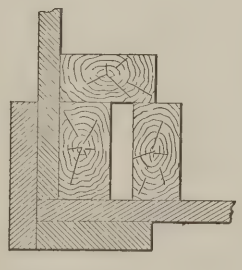
Mr. W. B. Nourse, of 425 Main street, Worcester, Mass., in speaking of his design, says: "What I have had in mind is a cottage house, although the upright portions of the second story side walls are left of more than sufficient hight for a person to stand upright. No attempt has been made on the exterior to go to the extremes of fashion or fancy, but rather to avoid extremes so far as possible and give a sensible modern design. In carrying out these ideas the roofs have been made to project a little more than has been fashionable in the immediate past, and the ruling style of windows, which are often so constructed as to be cut up with small panes of glass, has been departed from. Small panes of glass look monotonous and greatly increase the labor of the housekeeper in keeping them clean. At the same time the upper sash has been judiciously cut up in order to give variety and to afford an opportunity for introducing colored glass. Shingles on the exterior are used moderately. The roof is comparatively an easy one to frame, all the gables being nearly the same pitch. Gutters are intended to be dispensed with, being a nuisance in a climate like ours, If wanted, outside eave troughs could be used. A lip is provided on top of the belts and window caps, making a tight job after being clapboarded or shingled, without the necessity of using metal flashings. On verges, piazza, water table and window caps, &c., a moderate amount of beading is used in order to give the painter a chance for touching up the design in some bright color. In window frames the blinds are arranged to be flush with the casing when closed, this plan presenting a neater appearance, and the blinds so hung less liable to blow off in high winds. Attention is directed to the neat, but inexpensive, design for stairs, also the finish for doors and windows, mantels and sideboard. The mantels are more elaborate, it may be said, than need be in a house of this class, but the mantel is a conspicuous object and attracts more attention than other parts of the finish. A suggestion for outside painting is two shades of olive, the groundwork being darkest and the trimmings lighter, with the chambers, grooves, rosettes, &c., of verges, piazzas, &c., touched up with cherry color."



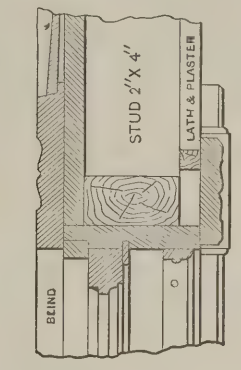
Elevation of Piazza.—Scale, ⅛ Inch to the Foot.

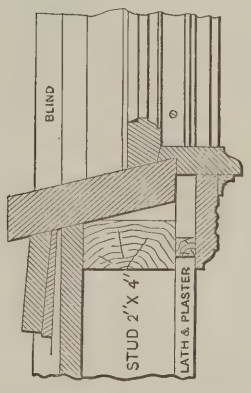


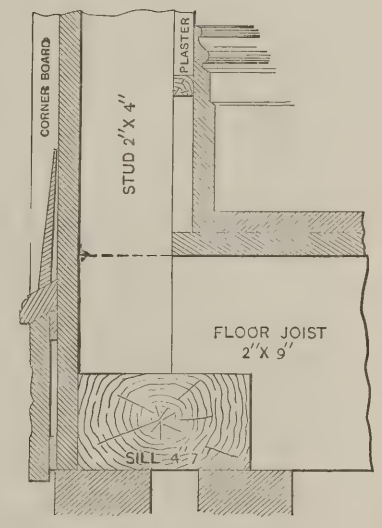
Section Through Balustrade.—Scale, ¾ Inch to the Foot.



Section of Corner.—Scale, ⅛ Inch to the Foot.







General Section Through Walls.—Scale, 1½ Inches to the Foot.

Details of House Design by W. B. Nourse, Worcester, Mass. (*For Perspective and Elevations, See Plates.*)

Preservation of Exposed Ropes.

The preservation of exposed ropes is a matter of great importance when scaffolding remains erected for any considerable time, especially in localities where the atmosphere is destructive of hemp fiber. It has been suggested that in such cases the ropes be dipped, when dry, into a bath containing 20 grains of sulphate of copper per liter of water, and lie in soak in this solution for four days, afterward being dried; the ropes will thus have absorbed a certain quantity of sulphate of copper, which will preserve them alike from rot and from the attacks of animal parasites. The copper salt may be fixed in the fiber by a coating of tar or by soapy water. In tarring the rope it is said to be better to pass it through a bath of boi'ed tar, hot, drawing it through a thimble to press back

the excess of tar, and suspending it afterward on a staging to dry and harden. According to another process the rope is soaked in a solution of 100 grains of soap per liter of water; the copper soap thus formed in the fiber of the rope preserves it from rot even better than the tar, which acts mechanically to imprison the sulphate of copper, which is the real preservative.

Concrete.

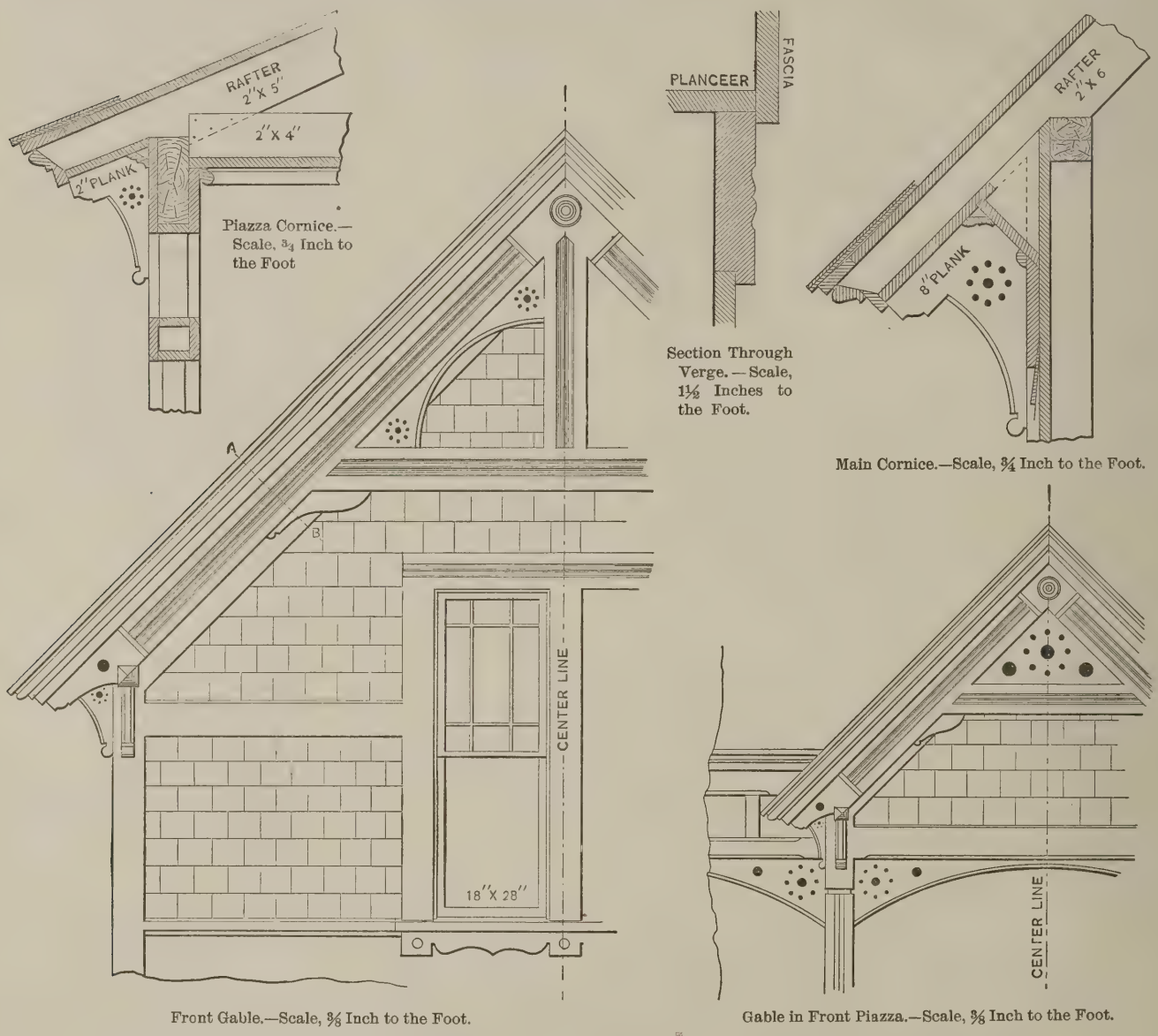
BY ARTUS

Few materials are more useful than concrete or more easily obtained, and few materials can be used for a greater variety of purposes or be prepared with less trouble. From paving to foundations, and from making belt courses and other trimmings to the consists of nearly pure carbonate of lime, to that in which a proportion of silica, alumina, iron and other foreign substances are present in a proportion sometimes as high as 50 per cent. of the whole mass. Pure lime swells in the process of slaking, emitting a quantity of heat and steam, and it dissolves in water, and is therefore not suitable for use in making concrete. Limes containing 8 to 12 per cent. of silica, alumina, iron, &c., possess the quality of setting slowly in water, while those containing from 12 to 20 per cent. of these substances will set in six to eight days, and those containing 20 to 30 per cent. in from two to four days. All such limes are termed "hydraulic" or "water" limes and they will not mix without an addition of sand varying from 50 to 180 per cent.

Cement, on the contrary, will set without limestones occur which are used in the same way.

Portland cement is an example of an artificially made cement in which sufficient quantity of alumina, &c., is added to the limestone to give it the required property of hydraulicity. Its manufacture differs from that of cements such as Rosendale in that it is twice burned, instead of only once, and at a higher temperature. It will, when ground, weigh some 30 to 35 per cent. heavier. It contains a larger proportion of foreign substances and is stronger and much more durable than American cements, but its cost is much higher, being approximately as 30 is to 11.

Rough tests of the quality of Portland cement are as follows: Weight, 110 to 120 pounds per struck bushel. Crushing strength of a cubic inch mixed without



Details of House Design by W. B. Nourse, Worcester, Mass (For Perspective and Elevations, See Plates.)

complete wall, it is alike convenient, strong, durable and economical. The strength and durability depend upon the quality of the materials of which it is composed and upon the manner in which it is mixed. Although so largely used, little seems to be generally known as to its proper manufacture. Much might be written on this interesting subject, but space will only permit us in this paper to consider the subject in its more important points.

Materials.—Concrete consists essentially of small portions of stones or other hard substances united together with a cementing material formed of a lime or cement mixed with sand or a suitable substitute, and the quality of the cementing material will chiefly determine the quality of the concrete.

Limes vary in composition from the variety known as pure or chalk lime, which sand, the addition of which weakens it proportionally to the amount mixed with it. All hydraulic cements contain lime, clay and oxide of iron in proportions varying with the kind. In some cases the limestone from which it is manufactured is naturally hydraulic to a sufficient extent to produce directly a cement which will set under water, and in other cases that quality is attained by an artificial admixture of the required materials. Most of the cements manufactured in the United States are of the former class. For example, the magnesian limestones deposits found in the town of Rosendale, N. Y., possess considerable hydraulic properties, and from them are manufactured the cement bearing that name. At Clarksville, Ind, are extensive beds of hydraulic limestone, from which is made cement termed the "Louisville cement," and at La Salle and Utica, Ill., and Buffalo, N. Y., sand, 4000 to 5900 pounds. Texture sufficiently fine to permit of at least 95 per cent. to pass through a sieve of 2500 meshes to the square inch. To test whether the cement shrinks or expands, mix a little cement without sand and place it in a small bottle full to the top. Leave the bottle in water for a few hours, and if the cement expands it will break the bottle, while if it shrinks a space between the cement and the bottle may be easily seen.

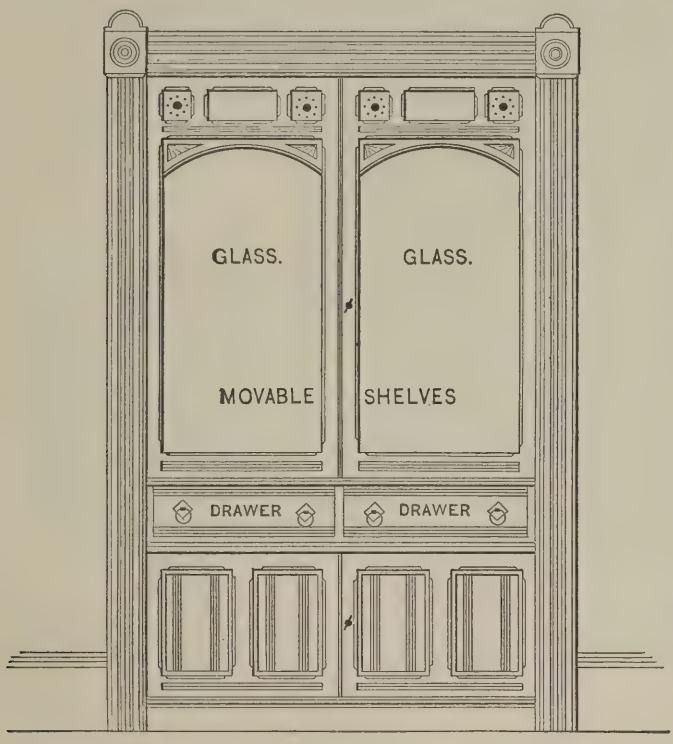
Sand, Core, &c—The best materials to mix with the lime or cement to form concrete are gravel and sand, but chippings of stone, broken bricks, stoneware or any hard and durable material will answer the same purpose if broken up into pieces of a size not exceeding that of a hen's egg. The sand must be of a quality clean and sharp and absolutely free from loam, earth or dirt, and it is of advantage to use a coarser vari-

ety with cement than with sand. Sea sand may be used with cement without detriment for concrete to be used in submerged positions. Where sand is expensive or not available a stiff clay thoroughly burnt and ground with the lime may be used as a substitute, or coarse ground coke, clinkers from brick kilns or broken and ground furnace slag may be used for the same purpose.

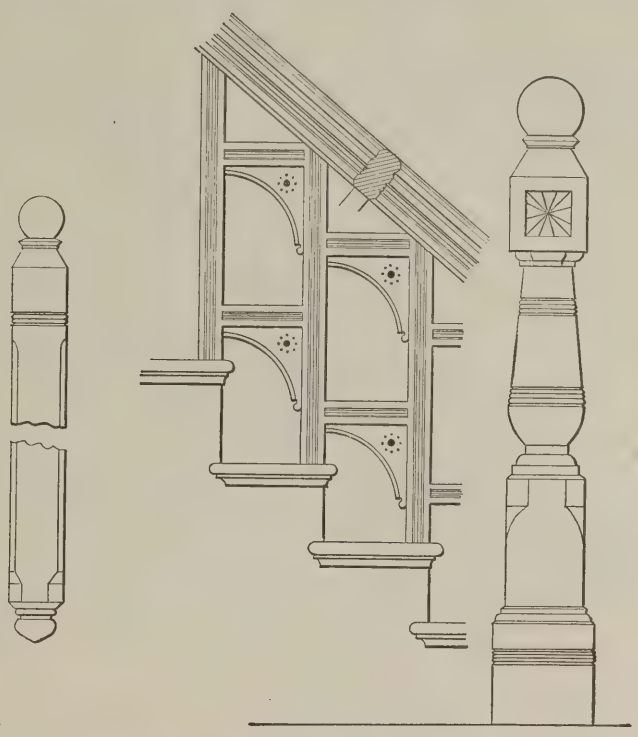
Mixing.—The proper and thorough mixing of concrete bears considerably upon its ultimate strength and durability. The plan usually practiced is to measure the materials (and care should always be exercised to obtain the correct proportions), to place them in a heap and while they dry to turn them over several times. Water is then added and the materials again turned over and over until a thorough mixture is effected. This, however, is not the proper method of mixing concrete. It will be seen that the object is to produce a kind of rubble masonry—stones or broken brick united by mortar—and the more scientific method, therefore, is to first properly mix the mortar and then to incorporate it with the stones or pebbles. By this method the lime or cement and sand are first mixed when dry, and are then mixed again when the water is added. When a mortar of the proper consistency is obtained the stones or ballast are added in small quantities, the mass being turned over each time so as to bring about a thorough admixture. Whichever method is employed, the utmost care must be taken not to add too much water. It is so easy and almost usual to deteriorate the quality of the mass by the addition of too much water that the harmful effects are here specially pointed out. Of course sufficient water must be added to wet every particle of the material, but every drop beyond will harm it. The core or ballast should always be wetted or soaked in water before using.

Ramming.—The heterogeneous composition of concrete gives rise to a number of small spaces between the stones, filled with air, and to get rid of them and produce a more solid, strong and compact mass it is economical to ram concrete to press its portions closer together. The ramming in the case of foundations is advisable, not only because it produces a stronger mass, but because the concrete, being then of equal consistency, insures a perfectly uniform settlement of the building. In using the material for foundations it is often the practice to throw the concrete from a hight in order that it may be pressed together by its own weight and so save the expense of ramming, but the practice is an exceedingly bad one, producing a result far worse than if the material were thrown in from the level and the ramming neglected altogether. The materials composing the concrete, varying in weight, separate on their downward course, and the result is that layers of stones may be found almost without cementing materials.

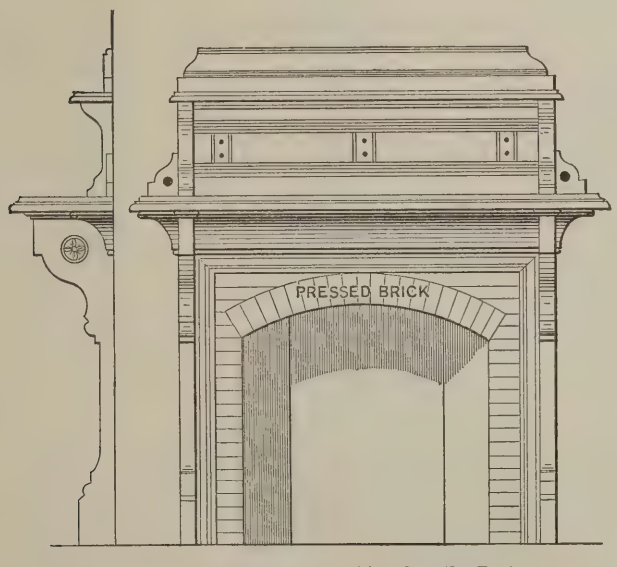
Concrete should never be disturbed when it has once commenced setting, by which it is to be understood is meant when it cannot be moved without fracture. The custom of filling in trenches in foundations and other constructions in layers is not a good one, although it is so largely practiced. The better plan is to fill in the whole quantity at one time, ramming it well down between the sides of the trenches. This cannot always be done, as, for instance, in the case of concrete buildings, and here and in other cases where the layers are used each layer should be allowed to set as far as is practicable before another is put in, and should be swept off free from dust or dirt that may have accumulated upon it, and be picked or



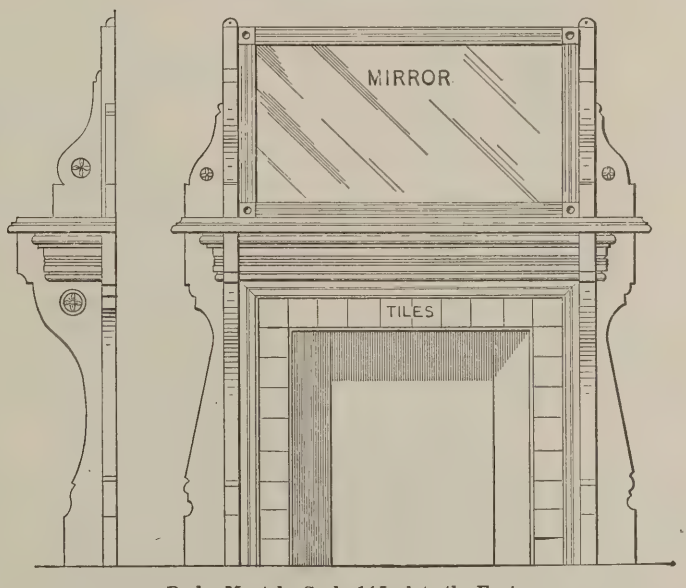
Sideboard in Recess, Corner of Dining-Room.—Scale, ½ Inch to the Foot.



Details of Front Stairs.—Scale, ¾ Inch to the Foot.



Sitting-Room Mantel.—Scale, ½ Inch to the Foot.



Parlor Mantel.—Scale, ½ Inch to the Foot.

Details of House Design by W. B. Nourse, Worcester, Mass. (For Perspective and Elevations, See Plates.)

roughened at its surface, before another layer is added.

Uses of Concrete.—The purposes for which concrete is suitable are so many and various that it is impossible to refer here to more than a few of the most important. For artificial foundations or those in which the ground is not sufficiently strong to support the weight of a building, concrete is the most suitable substance that can be employed, not only because it is the strongest and in most cases the cheapest material that can be used for the purpose, but also because it forms a perfect protection against any inroad of water which might occur at that point, and to which it is of course very liable.

Concrete blocks are now manufactured in great variety, some for building ordinary walling, occasionally formed with a cement face, and also in flat blocks for sidewalks and other paving. Then many ornamental blocks in imitation terra-cotta are formed ing them into molds formed of the width of the required wall by a series of planks or boards sliding on vertical guides. The molds are coated with a mixture composed of shreds of soap boiled in water until of the consistency of paint, and are moved up the guides all around the building as the concrete attains the required hardness. The requirements of concrete building do not necessitate the drawing up of special designs, although some architects have given such buildings some special treatment by relieving the bare walls with cement moldings and ornamental panels in colored cement, producing a very pretty effect and forming a most substantial building.

Proportions.—The proportions of materials used for the concrete will, of course, vary with the purpose for which it is required and the quality of the materials employed.

It should be remembered as an important fact that the ultimate strength and durability of the best qualities of Portland cement mixed with a large proportion of stones and sand, exceed that of a common cement mixed with a smaller quantity of stones and sand, so that as a rule, and certainly in all important positions, it is an unwise economy to use anything but the very best qualities of cement and lime. The following are some of the proportions of materials most usually employed :

1. One part of Rosendale cement to 2 parts of sand and 4 of broken material.

2. Three parts of unslaked hydraulic lime, 3 parts of sand, 1 part of gravel and 2 parts of broken limestone

3. One part of Portland cement, 3 of gravel and 3 of sand.

4. One part of lime, 1 of cement, 2 of sand and 4 of gravel.

5. One part of hydraulic lime, 2 of sand and 4 of gravel or ballast.

for various purposes. For floors, large underground cisterns or reservoirs, retaining walls and many other purposes it is used with great success, while in fire-proof construction it forms the bulk of the work. The setting of cement blocks, especially Portland, is promoted if they are placed in still water immediately after setting and allowed to remain until wanted for use.

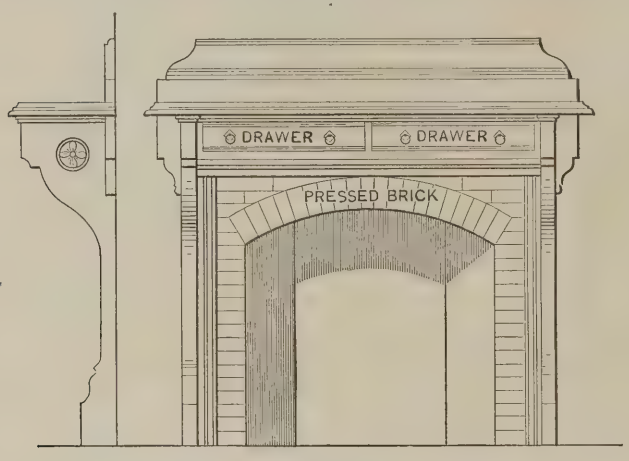
In no cases where a cement face is used for concrete, whether it be in a floor or in concrete blocks, should the two be placed in separate layers. The proper way is to mix the two at the same time and to lay one on the other without giving time for either to set, so that the face becomes a portion of the inner concrete and there is then no other skin or face which can break or crack off. In cellar floors the face will be troweled off to a smooth surface, and in blocks formed in molds a smooth face will be obtained either by the mold itself or by a trowel.

In erecting concrete buildings the process is very simple, consisting of mixing the materials as before described and in throw-

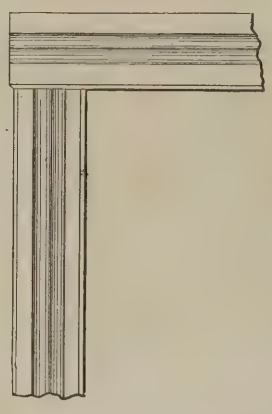
Walnut Stain.—Two ounces of washing soda, darkened with Vandyke brown in water as required; add 4 ounces of bichromate of potash, with 3 pints of water.

Cold Hammering of Iron.

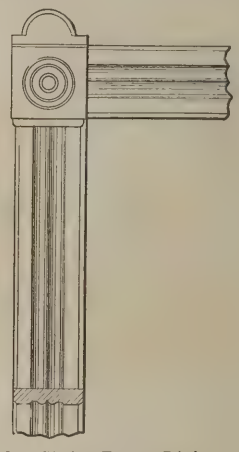
It either is or ought to be known to all practical men concerned in the working of wrought iron that, if a piece of the very best and toughest iron is hammered in the process of forging until it ceases to be red hot, the effect of such cold hammering, as I may term it, is to cause the iron to become so brittle that it will in many cases break across in the process, or, if it does not at that time, this process of cold hammering has so removed and destroyed its tenacity as to render it capable of being broken with the slightest blow. What renders the knowledge of the effects of such a process the more important is that in most cases we shall find that, in order to give the pieces of forged work the requisite finish and fine surface as they come from the hands of our workmen in that department, this very cold hammering and swaging, as it is termed, is required, the more so as it is by such a process that iron forgings are so finished from the hammer as to require the least possible labor after, and as every good workman in that department is anxious to turn his work out of hand with the very best surface on it, which this cold hammering enables him to do, it is not a very easy matter, and not at all desirable, to require them to discontinue the practice, which many endeavored to do from want of a full knowledge of the subject. There is nothing inherently wrong in this practice of cold hammering—far otherwise; the evil rests with the applying of such a cold-hammered piece of forgework to its purpose without having been passed through the curative process, which is simply this, namely, to heat the piece of forged-work in question to a dull red heat, and lay it down to cool at its leisure. By subjecting wrought iron to the most violent hammering or compression at a low temperature, and then submitting the ironwork so treated to the simple process of heating red-hot and slow cooling, we enhance its tenacity or shock-sustaining qualities at least 20 times.



Dining-Room Mantel—Scale, ½ Inch to the Foot.

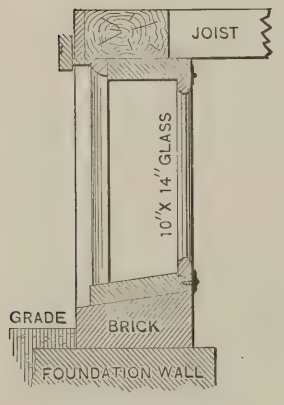


Finish in the Second Story Kitchen and Pantry.

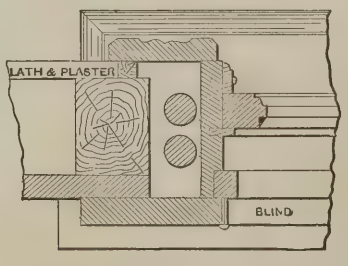


Finish of Parlor, Sitting-Room, Dining-Room and Front Hall.

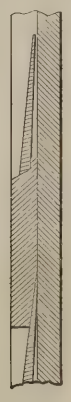
Scale, ¾ Inch to the foot.



Section of Cellar Windows.—Scale, ¾ Inch to the Foot.



Section Through Side Window.—Scale, 1½ Inches to the Foot.



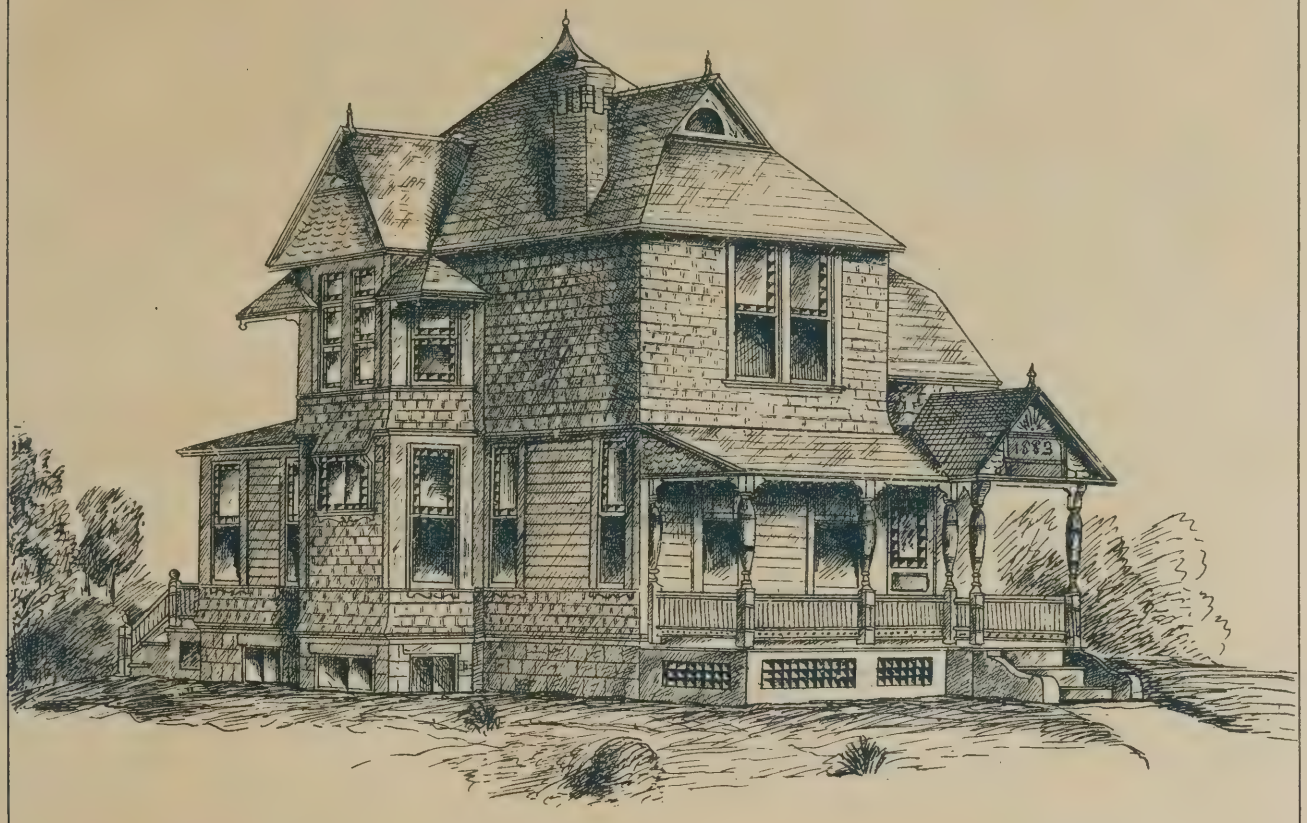
Belt at Top of First Story Windows.

Belt on Line of Second Story Window Sills.

Scale, 1½ Inches to the Foot.

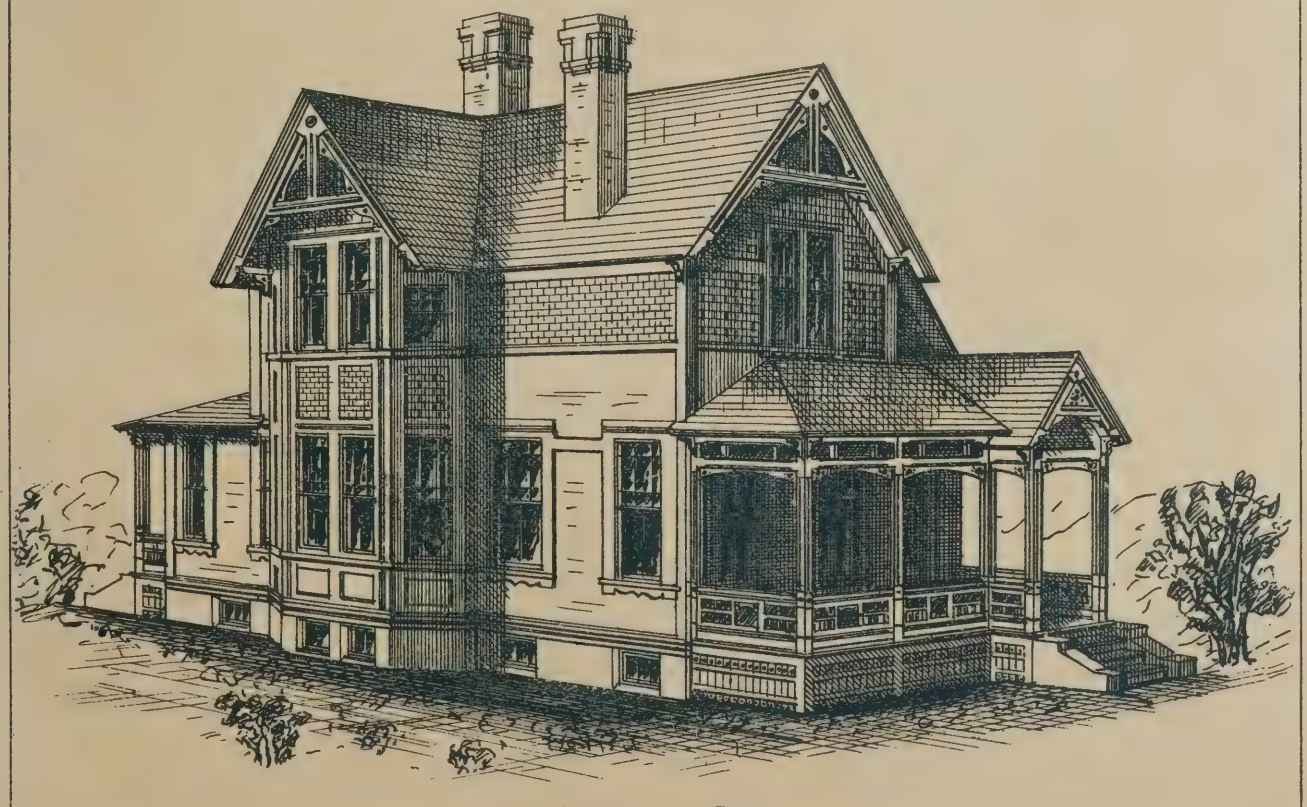
Details of House Design by W. B. Nourse, Worcester, Mass. (*For Perspective and Elevations, See Plates.*)

PLATE I.



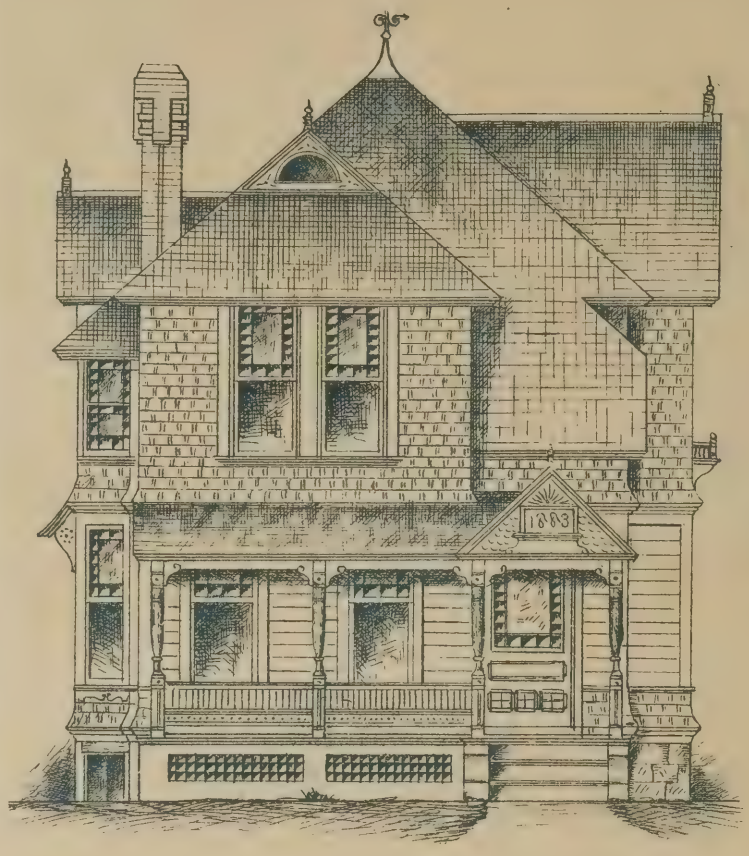
Perspective View.

House Designed by Eugene Rice, Denver, Col.



Perspective View.

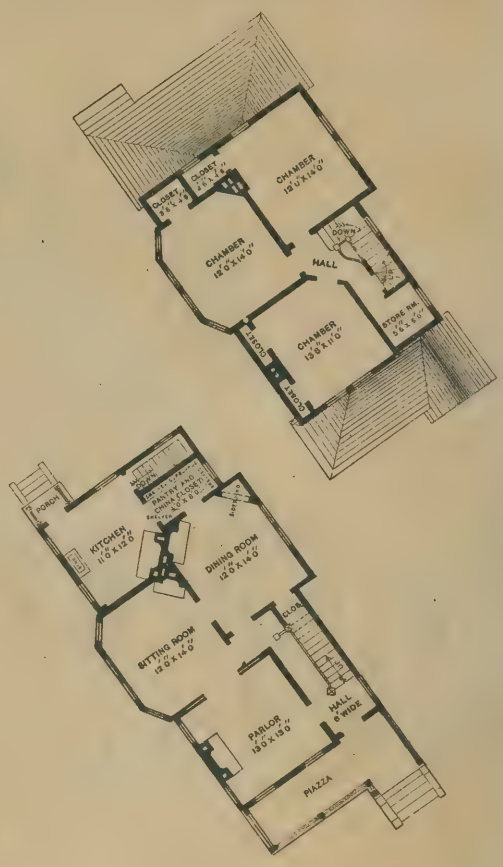
House Designed by W. B. Nourse, Worcester, Mass.



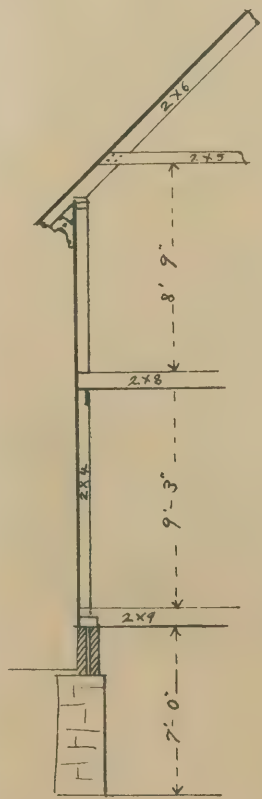
Front Elevation.

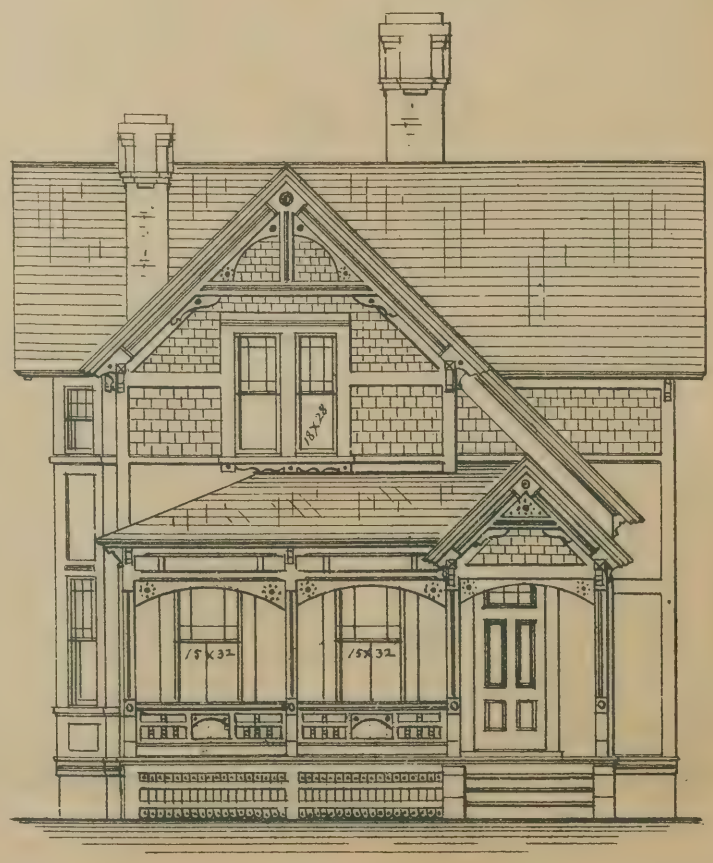
House Designed by Eugene Rice.

Scale ⅛ Inch to the Foot.



Floor Plans.-Scale ¼ Inch to the Foot.
For both Designs.



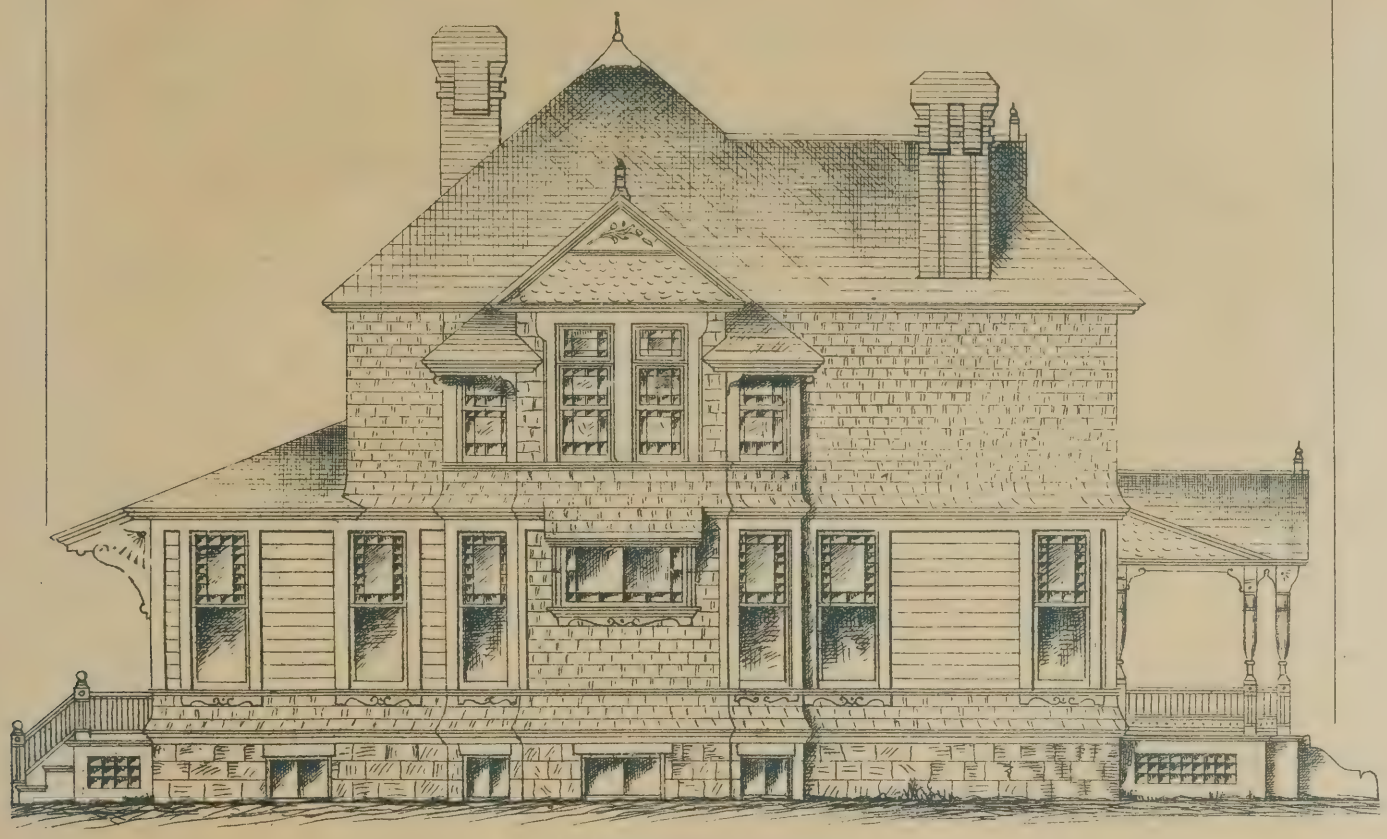


Front Elevation.

House Designed by W. B. Hourse

Scale ⅛ Inch to the Foot.

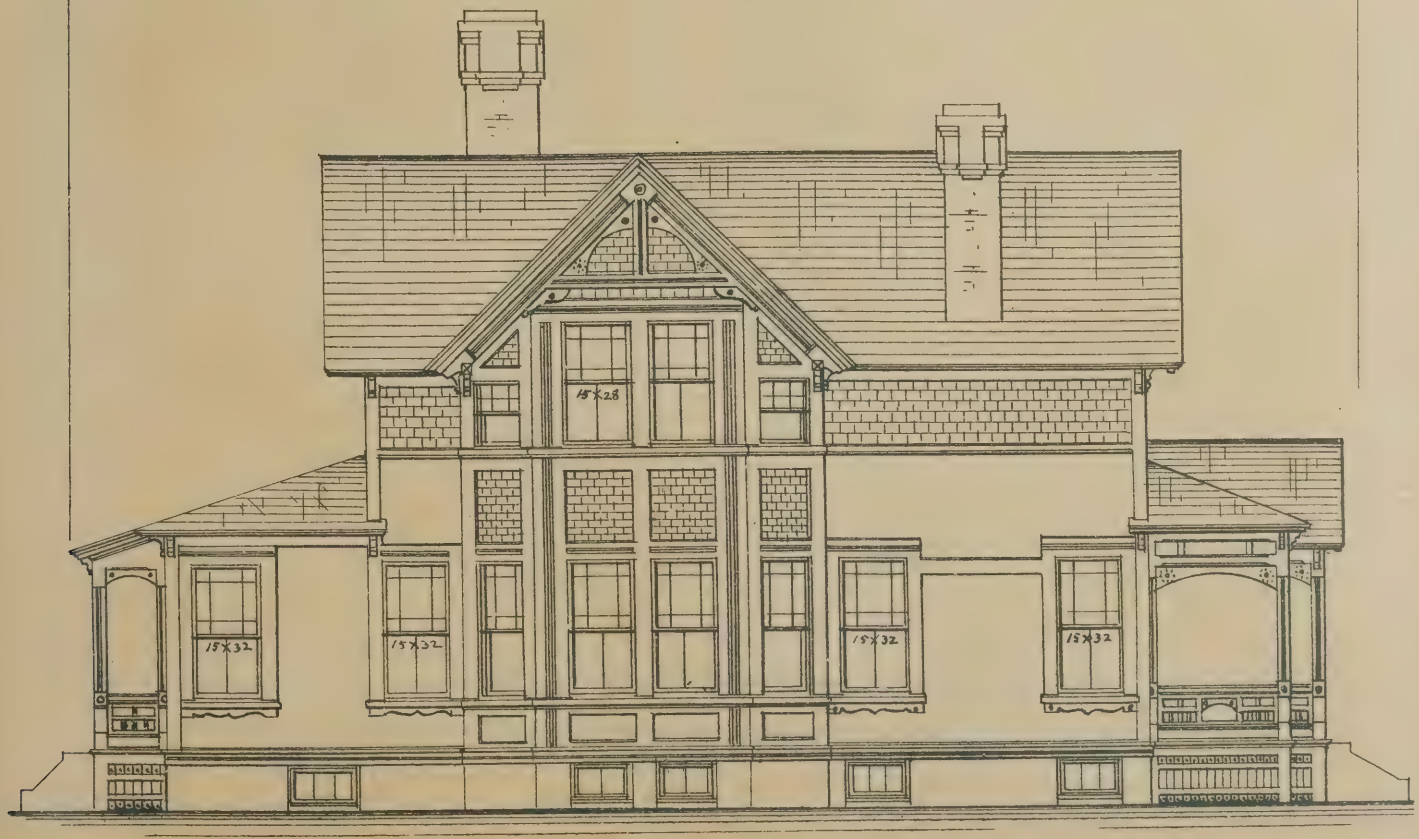
PLATE III.



Left Side Elevation.

House Designed by Eugene Rice,

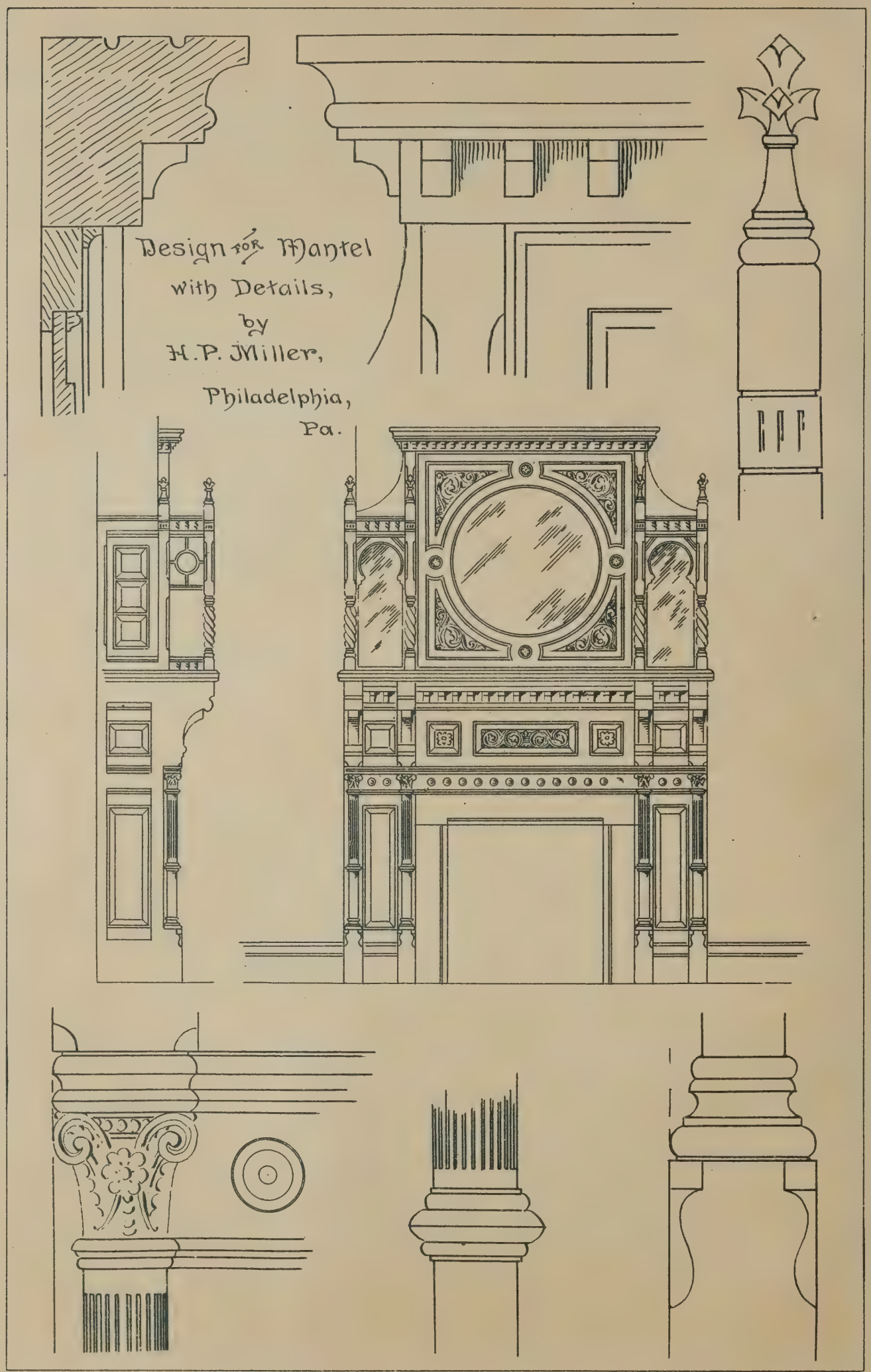
Scale ⅛ Inch to the Foot.



Left Side Elevation.

House Designed by W. B. Hourse.

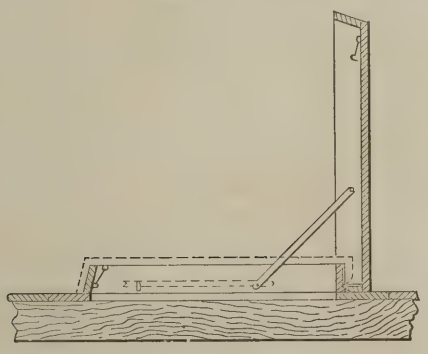
Scale ⅛ Inch to the Foot.


Design for Mantel
with Details,
by
H.P. Miller,
Philadelphia,
Pa.

CORRESPONDENCE.

Construction of Scuttles.

From R. F. DE G., *Washington, D. C.*—I wish to direct the attention of readers of *Carpentry and Building* to the desirability of improving the construction of roof openings and the covers for the same for the better convenience of those having occasion to visit the tops of their houses. The common plan for finishing such a part of a building anticipates leaving a square opening with a loose cover. The sides of the cover are square with the top, which makes it in many cases very difficult to open, sometimes making it impossible of accomplishment by any one except a powerful man. Such a plan seems to be out of keeping with modern ideas, in view of the fact that improvements can be made without any difficulty. The accompanying sketches show a frame and cover made in a way to obviate these difficulties. The box as shown in Fig. 1 is made similiar to the old-style box on three sides. The lower side, however, is made different, being set at an angle of about 120° from the top down. The cover when made to correspond with this box will be easy to lift, and the accuracy in lifting



Construction of Scuttles.—Fig. 1.—*Section of Frame and Cover.*

and letting down the cover which is necessary with the usual device will not be required with it. The ordinary square cover, when it is to be opened, must be lifted at the four corners evenly, and in shutting it must be brought down in the same manner. A cover made as here suggested, however, will only require lifting at one end. The other end I propose shall be fastened by hinges in the manner indicated in the drawing. When the cover is down these hinges will not be seen from the inside nor yet from the outside, and they will be well protected. The side of the cover on which the hinges are fastened will be 1 inch narrower than the other side. In other words, there will be 1 inch space from the lower

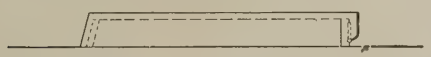


Fig. 2.—*Side View or Section with Cover Down.*

edge to the roof. This space is necessary in order to allow the cover to turn in opening and while it stands in a vertical position. A brace may be added to hold the cover steady when in a vertical position, thus preventing the cover from dropping accidentally. A hook and eye may also be added on the side opposite the hinges for better protection. The hinges of the frame will be fastened on top of the tin covering. An allowance for the thickness of the hinge and tin is to be made by cutting the wood away sufficiently so as to allow the tin to be hammered in and the hinges to be even with the side. On the cover the hinges are also let into the wood their own thickness. I shall be glad to have the readers of *Carpentry and Building* give attention to this suggestion, and if other devices for accomplishing the same ends can be produced they will be welcomed by many who are interested.

Wood Turning.

From W. H. G., *Philadelphia.*—I desire a little advice through *Carpentry and Building*. I am a wood turner and wish to start in the business for myself. I have foot-power machines for turning both round and square work. I want to do only the best work, and to so conduct my business that I can keep my word when I promise anything. What I want to know is how I can get a good start and what city you would advise me to commence business in. Would it be better to commence here or elsewhere? The great trouble that I fear is owing to the fact that I am no great talker, and may not be able to present myself as well as I can work. I can work much better than I can talk. You will be sincerely thanked if you will answer my questions so far as possible.

Note.—We are always glad to give our readers any advice that we are able, more particularly when it is sought and when there is the assurance that it will be appreciated. One question that our correspondent asks it is impossible for us to answer satisfactorily, and that is with reference to location. Our knowledge of industries in the different towns and cities is not sufficiently intimate to enable us to say that one place offers better inducements than another in the line of work in which he proposes to engage. Speaking in the most general terms, we should think with the platform that he lays down, namely, that of the very best work and a scrupulous respect for promises made, he should not find much trouble in making a satisfactory beginning almost anywhere. Probably that city in which he is best acquainted is the best place for his purpose. Our correspondent speaks of foot-power machines. We think if he makes a great success he will be compelled to change from foot-power to steam power. This, however, does not necessarily involve a change in the machines themselves, for steam-power can undoubtedly be applied to existing devices as wanted. Wood turning requires very high speed and it is severe labor, to say the least, to maintain by foot the speed that is necessary for good work. Our cooresponden-ent is in doubt as to his ability as a talker. His letter is well and carefully written, and indicates that he is a man of discrimination and judgment. If the inability to talk well, or "to put the best foot forward," as the saying is, in business troubles him, attention should be paid to the art of conversation, and no opportunity should be negleted to practice, so that in the course of time the ability to attend to the business end of his little enterprise will be acquired. Being such a man as our correspondent leads us to believe he is by the style of this letter, we think he should meet a fair measure of success almost anywhere that he may start. It will perhaps be necessary for him, however, at the outset to give up preconceived notions. The successful man in business is the one who is prepared to give up ideas which do not pay, no matter how often he is obliged to change. Our correspondent no doubt has his notions as to how things should be managed in case he enters into business for himself. We venture to say, however, that before the close of the first six months he will find that his ideas are wrong in some respects, and that his plans need modifications. In saying this we do not disparage our correspondent. The same can be said of almost every one. Under the circumstances we are unable to give our correspondent any advice other than is contained in these remarks.

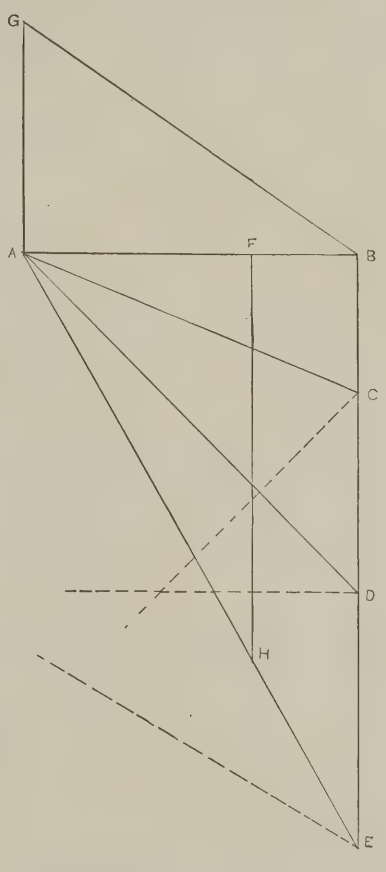
Wrinkling of Drafting Paper.

From L. D. H., *Findlay, Ohio.*—Will you please explain the cause of drafting paper buckling or wrinkling after it has been fastened to the board, or, rather, will you tell me how to remedy this difficulty?

Answer.—Drafting paper of various kinds buckles or wrinkles when in use on account of changes in the atmosphere. Sometimes the variation in the surface of the paper is sufficient to make a great deal of trouble in fine drawings. It even extends so far in some instances as to vitiate the scale to which the drawings are being made. Changes occur in some cases very suddenly, and in other instances they take place slowly. A very common method resorted to by draftsmen is to stretch their paper upon the board by wetting it, then gluing the edges in place and allowing it to dry. This plan is very commonly resorted to where white drawing paper is used. We do not know that any plan meets the case where common manila paper—or detail paper, as it is frequently called—is used.

Cutting Cornice and Roof Boards on an Octagon Roof.

From W. S. W., *Washington, Ind.*—It would seem from the silence which exists on the subject of bevels in the last few numbers of *Carpentry and Building* that the subject is regarded as being exhausted. It will be remembered that some time ago I asked for a rule for cutting cornice and roof boards on an octagon roof of any pitch, and I supposed that there were plenty of your readers who would be able to give such rule, but all the reply I have received is from "Cymro," in the September number; hence I have concluded that either the subject was not well understood or was not of sufficient importance to be worth attention. "Cymro's" method is correct; certainly it is; how could it be otherwise? But it is lacking in



Cutting Cornice and Roof Boards on Octagon Roof.

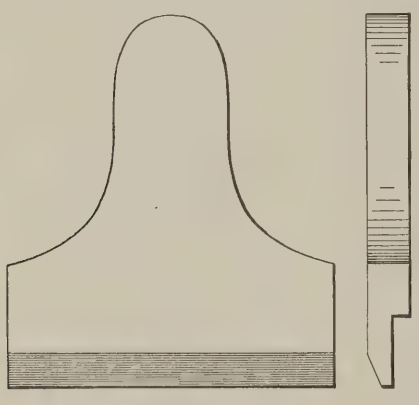
just the points I wished light on; it is not scientific. If we were to pursue his method with regard to all hip roofs we would not need to study and understand all that has been written on the subject of hopper bevels in the past numbers of *Carpentry and Building*. But these problems worked out in practice are just what makes carpentry interesting. In studying the subject of bevels as used in our trade I have been led to believe that the steel square can be so applied as to give all straight cuts used in building.

In my practice for several years past I have used the steel square and a straight-edge for getting all the bevels used on an ordinary hip roof. I inclose a sketch which will illustrate my method of getting the bevels that I asked for, and will say that I have never seen this method published or used by any one before. Referring to the sketch, let A B represent the seat of common rafter, A G the rise of roof; then G B is the

length of common rafter; A C, A D and A E are seats of different hip rafters; A C is the angle for an octagon corner; A D is for square corner, and A E is an angle of 60°; the dotted lines complete the corner, showing the same angle on the opposite side; A F is the rise of roof set off from A, the center. Now, to make the cut across cornice boards standing with the pitch of the roof, use the length of common rafter on the blade of square and the half width of the building on the tongue; the tongue gives the cut for the miter or plumb cut. Use the length of common rafter on the blade, and on the tongue take the distance from the point F to where the line F H cuts the seat of hip; the tongue gives the cut. It will be seen that the same principle applies to hips standing on any angle.

Marking Door Butts.

From J. D. B., *Ohio.*—In the October number of *Carpentry and Building* there was described an adjustable rule attachment, in which, among many other things which could be accomplished by it, marking of door butts was mentioned. Now, I have a plan which I think is very desirable in this work. I inclose a sketch of the device which I employ, and which I call a "butt block," that may interest some of the readers of the paper. In this section of the country we usually make a square frame and put on our stops after the door is hung. I make a



Device for Marking Door Butts, Described by J. D. B.

block to fit the butts. After the door is completed I set it in place and mark for the butts. I then take my block and put it where the butt is to go, and mark about it as quickly as I could make one mark with the gauge. Of course there are some jambs with which this plan would not work, but it will work on all doors.

Relative Dryness of Steam and Furnace Heat.

From C. E. C., *Howells, N. Y.*—Will you kindly inform me, through the columns of *Carpentry and Building*, which is the dryest, furnace or steam heat? By furnace and steam heat I mean that which comes to the room through hot-air pipes from an ordinary furnace placed in the cellar and that given off by steam radiators or steam-pipes in the room itself.

Answer.—To reply to our correspondent's question intelligently we should know certain conditions which he has not stated, but we think by assuming a few things we can give him a satisfactory answer. We will suppose that the hot-air furnace takes air from out of doors and that a water chamber is provided for moistening the heated air, also that the steam radiators are of the ordinary kind and without any connection with the outer air. Under such conditions the steam heat will be the dryer, for the air of the room is heated by radiation from and contact with the radiators and the amount of moisture in the air remains unchanged. On the other hand, the heated air from the furnace has taken up moisture from the water-pot and it carries this moisture to the room which is heated. These conditions, however, may easily be changed. For instance, if the furnace has no water-pot and the day is exceptionally dry the heated air which rises through the registers will also be very dry, and the effect will be practically the same as if radiators were used, so far as moisture is concerned. Again, if a pan of water be placed on the radiator the air of the room may be made as moist as is desirable. The whole question simply depends upon the amount of water present in the air, the heat itself, if we may use the expression, being the same in all cases. It should be borne in mind in this connection that the sensation experienced of moist or dry air is largely governed by temperature. Of two bodies of air of different temperature, but each containing the same amount of moisture, the one highest in temperature will feel the dryest. This will be understood by briefly explaining that the cause of the sensation of moisture or dryness in air is the evaporation of the moisture from the skin. If the air is dry a rapid evaporation takes place, but if humid the evaporation is very slow. We might discuss the question of the sensation of moisture and the relative effects of the different systems of heating on air, but we doubt if it would prove of any great interest to our correspondent. In closing our remarks we would direct our correspondent's attention to the well-known fact that water evaporates and that heated air is rapidly moistened by contact with water. We would also mention that all sources of heat have the same effect on air and that by heating the moisture in the air is neither increased nor lessened, provided no water or damp bodies be brought in contact with the air.

Defective Acoustics.

From J. M., *Amelia, Ohio.*—We have a church 40 x 60 feet, with the ceiling 18 feet high. The echo and singing sound of the voice of a speaker in this room are very annoying to the hearer. The building is frame and plastered. There is no appreciable difference when the building is crowded or partially filled. Can you suggest any means by which the difficulty can be overcome?

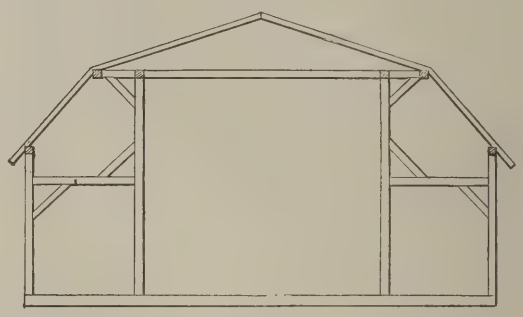
Note.—We have referred to troubles of this kind on various occasions. There is no royal road to overcoming defective acoustics. The difficulty in this case is probably in the proportions of the room, and unless some radical change is made the trouble will not be removed. In some cases stringing of wires through the upper part of the room answers a good purpose. In other cases draperies are hung at the end of the room, the theory being that the waves of sound will be broken rather than reflected, as at present. In all probability the best thing to do under the circumstances is to conduct a few experiments, carefully noting the result of each. Whenever a sign of improvement is noticed, follow up that course. Wires should be tried, running them at different hights and more or less of them, as circumstances may indicate. This failing, we should festoon some flags or other drapery across one or both ends and a little removed from the end walls. It is very difficult in the space of a short article to suggest the different expedients that might be resorted to, some of which will no doubt help, if not remove, the difficulty.

Framing Purlins.

From J. D. B., *Orangeville, Ohio.*—In the November issue of *Carpentry and Building* a correspondent from Newark, N. J., desires to know how to frame purlins. My opinion is that if he only wants to support the rafters it will make no difference whether the purlins stand plumb or at right angles with the rafters. Thirty years' experience in a section of the country where we try to build for strength leads me to be of this opinion. I frame my purlins and wall-plates both alike, usually using 8 x 8 timber. I so manage the purlin beams as to help to tie my barn together at the top. I lay my mortise 2 inches from the inside and pin from the inside. Then I have a 4-inch shoulder on the outside that greatly helps to keep the plate from canting out. All beam and sill mortises I lay in the center of my timber.

Barn Framing.

From H. H. B., *Reading, Mich.*—I want some assistance in the matter of framing a barn roof. I inclose a sketch from which my requirements will be easily understood.



Barn Framing.—Sketch with Letter from H. H. B.

The cap of the top of the purlin posts is the trouble. I want some plan of construction that is easy, and one likely to be understood by farmers, and at the same time strong. The barn indicated by the accompanying sketch is 40 feet wide, with main posts 20 feet high. If any of the readers can assist me in this matter they will confer a favor.

Curing a Smoky Chimney.

From T. T., *Berkeley Springs, W. Va.*—I have a question to propose. Please tell me what is the best remedy for curing a smoky chimney without building it higher, the chimney with which I am having trouble being already very high. It is higher than any other chimney in our town, and yet it smokes. Our town is situated between two mountains.

Answer.—Our correspondent proposes a very difficult question, one, in fact, which it is impossible to answer satisfactorily with the meager data at our command. Unless there are other chimneys in the same town similarly located and affected in the same general way, it is fair to suppose that the situation between the two mountains is not entirely responsible for the lack of draft. Inasmuch as the chimney has been carried higher than the buildings by which it is surrounded, it would seem that there must be some other reason for its smoking than the influence of some outside cause. So much investigation and reflection would lead us to suppose that the smoking was on account of some obstruction in the chimney, or else some opening in the chimney besides that in immediate use. Our correspondent does not state whether a stove or grate is used. If a grate is used, the fault may be entirely in the setting of the grate; in other words, in the shape of the throat of the grate. If a stove is employed, the pipe may extend too far into the flue. There may be an open pipe-hole besides the one used for the entrance of the pipe that is in use. It may not be even an open pipe hole; there may be another stove connecting at the flue at this point in such a manner as to interfere with the draft. It is possible that the draft is spoiled by an open fireplace in a story below or a story above. Still other hypothetical reasons might be proposed, no one of which can be definitely asserted to be the true cause without further facts. We suggest a more careful survey of the premises with some of the ideas in mind which we have suggested above. Our correspondent asks the question with the idea that some ventilator or chimney-cap could be suggested for use in the place named. We know that these devices are very useful in many instances. We know also that in many cases they amount to little more than additional obstructions to the draft. Accordingly we are not prepared to recommend them unconditionally. They are more likely to work when all other conditions are right

than when there is something radically wrong about the flue in itself. Some such device might be relied upon to prevent a down-draft, but preventing a down-draft alone would not remove the smoke complained of in case it is caused even in part by an open fireplace, a misplaced stove-pipe or some similar reason.

Trouble with Plastering.

From F. B., *Zenas, Ind* —I have had difficulty with a job of plastering, which I will describe in the hope that some of the practical readers of the paper may explain the cause of the trouble. The plastering does not seem to dry as it ought to do. I send some samples with this letter, labeled respectively, first, second and third coat. I shall be glad to have the Editor examine them and express his opinion concerning them. My carpenter was housing window caps on the upper floor, working on trestles. The result was that he jarred a great lump, say a yard or more, off the lower ceiling. The carpenter began his work two weeks after the putty coat went on. His idea was that it was not dry at that time, because it had been put on too soon. In order to enable you to judge intelligently in this controversy, I will describe the mixing of the mortar: The water was poured into the slack-box, which was set inclining. The lump lime was poured above, and the lime was brought, by the hoeful into the cold water. The putty was left standing eight days, and the sand mixed with it as used. You will see in what proportions the ingredients were used by the samples that I send you. The putting on of the scratch coat was intended as green work. It was left standing one day, and then the brown coat was put on. The work was then left about a week, after which the putty coat was put upon the wall. I am not prejudiced against either carpenter or plasterer, but I am interested to know who is right in this controversy, and who should stand the damage for knocking off the plastering as above mentioned. There is a complete separation between the first coat and the second coat wherever a crack occurs, and these are frequent. There is also more or less chip cracking in various places. The joists in the building are placed 16 inches between centers, are 2 x 8 inches in size, and are 16 feet long. They are trussed to 2 x 5 rafters, inclining at an angle of 45°, leaving a clear space of 10 feet and seeming to be perfectly solid. The plasterer thinks the work will yet be all right, but the carpenter claims that the plaster will not pass muster on account of the way and time at which the different coats were applied.

Note.—However careful we may be in a matter of this kind, it is very difficult to give a satisfactory answer. The samples which we have examined of course are dry, whatever may have been their condition when they left our correspondent. There seems to be a lack of adhesion in the particles, and the mortar, whichever coat is considered, crumbles between the fingers much more easily than we would expect of good mortar. The samples were somewhat damaged in transit in the mails, so that we are not certain that their condition on reaching us fairly represents the work in question. A great many circumstances are to be taken into account in deciding a matter of this kind. We do not know who supplied the materials used in this job. If the mason supplied lime, sand and hair, and had entire charge of the work, it would appear to us that he alone is responsible for bad results. The sand is not as sharp as would be used in most sections of the country, and yet it may be as sharp as the neighborhood affords in which this work was done. The lime, so far as we can judge by the samples sent us, is not up to the standard of most sections of the country. All this being said, the difficulty may not be in the direction stated, but instead in the way in which the materials were used and applied. If our readers have any suggestions to make we shall be glad to hear from them. The fact that a large section of mortar jarred from the ceiling so easily as mentioned above we should think was conclusive evidence of the inefficiency of the work in general.

Ownership of Plans.

From J. I. M., *Westerly, R. I* —Concerning the ownership of plans, it may interest the readers of *Carpentry and Building* to know that the law in Rhode Island is such as to give the architect due protection in the submission of plans, whether in competition or otherwise. For the sake of illustrating this point I will refer to some cases which have recently occurred. In the competition for designs for a new schoolhouse to be built in one of our cities a number of architects submitted plans. One design was selected as being nearer to the ideas of the committee than any of the others. The architect gave his estimate of the cost, but the committee thought best to obtain an estimate from a practical builder, in order to determine whether the building could be built within their limit or not, thus settling the question as to the acceptance of the plans. The architect informed the committee that by submitting his plans to a builder for an estimate they by that act accepted the plans and must pay for them, unless he specially gave them permission to do so. Another case came to my notice recently. A New York lawyer wishing to build a house at a Rhode Island seaside resort allowed two architects to submit plans, thinking that he would accept the design that he liked best or would cost the least to build. The sequel proved that he did not understand Rhode Island law as well as New York law. He found, to his sorrow, that when he attempted to drop one of the architects he was obliged to pay for the plans just the same. If this law was in more general existence, and was known and observed, there would be much less troubling architects where attempts are made to obtain plans without any intention to pay for them.

Boring Worms.

From C. N. M., *North Ridgeville, Ohio.*—Will some reader who has had experience tell me what will stop the ravages of the worm that bores into ash finishing lumber? I have been troubled with this pest even after the finishing material has been put in place and oiled.

Foundations.

An eminent writer in a recent issue of the *British Architect* presented the following general remarks on the subject of foundations: The modern architect has at his command means and appliances of the greatest utility which were unknown to men in former times. Steam can be brought to aid in driving timber piles, and simple applications of water or air will sink hollow iron piles with comparative ease. The old Eastern plan of forming deep wells and then filling them up with concrete has been too much neglected. Modern well-sinkers will go down in any strata almost to any depth—certainly to any depth required in practice—and a secure foundation may thus be made for the loftiest structure in the most difficult ground. Masses of concrete or of brick or stone work placed on a compressible substratum, however cramped and bound, may prove unsafe. Solidity from a considerable depth can alone be relied on. Enlarging the area of a base or foundation by footings can be resorted to; but mere enlargement of area may not in itself be sufficient. A lofty structure which is to stand secure must have solidity sufficient to maintain each part in the position in which it is first placed. Foundations are too frequently slighted, or labor and material are wrongly applied. The compressibility of oolitic and tertiary clays can only be overcome by piling, deep sinking, heavy ramming or heavy weighting. The point of bearing must be carried below any possibility of upward reaction. A heavy embankment or heavy pile of building frequently disturbs the surface ground at a distance of many yards, the subsidence causing a correspond-

TABLE OF NUMBER OF JOISTS AND NUMBER OF FEET OF 2 x 5 INCH JOISTS IN GIVEN LENGTH AND WIDTH OF BAY, SET 16 INCHES FROM CENTERS.

Allowance is made for 6 inches at each end to rest in or on the wall, and one joist each side of bay.

Length of joist.	L'gth of bay.	Number of joists. 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of feet in each additional joist.
	Width of bay.	4′ 2″	5′ 6″	6′ 10″	8′ 2″	9′ 6″	10′ 10″	12′ 2″	13′ 6″	14′ 10″	16′ 2″	17′ 6″	18′ 10″	20′ 2″	21′ 6″	22′ 10″	24′ 2″	25′ 6″	26′ 10″	28′ 2″	29′ 6″	30′ 10″	
5	4	16 4/6	20 5/6	25	29 1/6	33 2/6	37 3/6	41 4/6	45 5/6	50	54 1/6	58 2/6	62 3/6	66 4/6	70 5/6	75	79 1/6	83 2/6	87 3/6	91 4/6	95 5/6	100	4 1/6
6	5	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	5
7	6	23 2/6	29 1/6	35	40 5/6	46 4/6	52 3/6	58 2/6	64 1/6	70	75 5/6	81 4/6	87 3/6	93 2/6	99 1/6	105	110 5/6	116 4/6	122 3/6	128 2/6	134 1/6	140	5 5/6
8	7	26 4/6	33 2/6	40	46 4/6	53 2/6	60	66 4/6	73 2/6	80	86 4/6	93 2/6	100	106 4/6	113 2/6	120	126 4/6	133 2/6	140	146 4/6	153 2/6	160	6 4/6
9	8	30	37 3/6	45	52 3/6	60	67 3/6	75	82 3/6	90	97 3/6	105	112 3/6	120	127 3/6	135	142 3/6	150	157 3/6	165	172 3/6	180	7 3/6
10	9	33 2/6	41 4/6	50	58 2/6	66 4/6	75	83 2/6	91 4/6	100	108 2/6	116 4/6	125	133 2/6	141 4/6	150	158 2/6	166 4/6	175	183 2/6	191 4/6	200	8 2/6
11	10	36 4/6	45 5/6	55	64 1/6	73 2/6	82 3/6	91 4/6	100 5/6	110	119 1/6	128 2/6	137 3/6	146 4/6	155 5/6	165	174 1/6	183 2/6	192 3/6	201 4/6	210 5/6	220	9 1/6
12	11	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	10
13	12	43 2/6	54 1/6	65	75 5/6	86 4/6	97 3/6	108 2/6	119 1/6	130	140 5/6	151 4/6	162 3/6	173 2/6	184 1/6	195	205 5/6	216 4/6	227 3/6	238 2/6	249 1/6	260	10 5/6
14	13	46 4/6	58 2/6	70	81 4/6	93 2/6	105	116 4/6	188 2/6	140	151 4/6	163 2/6	175	186 4/6	198 2/6	210	221 4/6	233 2/6	245	256 4/6	268 2/6	280	11 4/6
15	14	50	62 3/6	75	87 3/6	100	112 3/6	125	137 3/6	150	162 3/6	175	187 3/6	200	212 3/6	225	237 3/6	250	262 3/6	275	287 3/6	300	12 3/6
16	15	53 2/6	66 4/6	80	93 2/6	106 4/6	120	133 2/6	146 4/6	160	173 2/6	186 4/6	200	213 2/6	226 4/6	240	253 2/6	266 4/6	289	293 2/6	306 4/6	320	13 2/6
17	16	56 4/6	70 5/6	85	99 1/6	113 2/6	127 3/6	141 4/6	155 5/6	170	184 1/6	198 2/6	212 3/6	226 4/6	240 5/6	255	269 1/6	283 2/6	297 3/6	311 4/6	325 5/6	340	14 1/6
18	17	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	15
19	18	63 2/6	79 1/6	95	110 5/6	126 4/6	142 3/6	158 2/6	174 1/6	190	205 5/6	221 4/6	237 3/6	253 2/6	269 1/6	285	300 5/6	316 4/6	332 3/6	348 2/6	364 1/6	380	15 5/6
20	19	66 4/6	83 2/6	100	116 4/6	132 2/6	150	166 4/6	183 2/6	200	216 4/6	233 2/6	250	266 4/6	283 2/6	300	316 4/6	333 2/6	350	366 4/6	383 2/6	400	16 4/6
21	20	70	87 3/6	105	122 3/6	140	157 3/6	175	192 3/6	210	227 3/6	245	262 3/6	280	297 3/6	315	332 3/6	350	367 3/6	385	402 3/6	420	17 3/6
22	21	73 2/6	91 4/6	110	128 2/6	146 4/6	165	183 2/6	201 4/6	220	238 2/6	256 4/6	275	293 2/6	311 4/6	330	348 2/6	366 4/6	385	403 2/6	421 4/6	440	18 2/6
23	22	76 4/6	95 5/6	115	134 1/6	153 2/6	162 3/6	191 4/6	210 5/6	230	249 1/6	268 2/6	287 3/6	306 4/6	325 5/6	345	364 1/6	383 2/6	402 3/6	421 4/6	440 5/6	460	19 1/6
24	23	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	20
25	24	83 2/6	104 1/6	125	145 5/6	166 4/6	187 3/6	208 2/6	229 1/6	250	270 5/6	291 4/6	312 3/6	333 2/6	354 1/6	375	395 5/6	416 4/6	437 3/6	458 2/6	479 1/6	500	20 5/6
26	25	86 4/6	108 2/6	130	151 4/6	173 2/6	195	216 4/6	238 2/6	260	281 4/6	303 2/6	325	346 4/6	368 2/6	390	411 4/6	433 2/6	455	476 4/6	498 2/6	520	21 4/6
27	26	90	112 3/6	135	157 3/6	180	202 3/6	225	247 3/6	270	292 3/6	315	337 3/6	360	382 3/6	405	427 3/6	450	472 3/6	495	517 3/6	540	22 3/6
28	27	93 2/6	116 4/6	140	163 2/6	186 4/6	210	233 2/6	256 4/6	280	303 2/6	326 4/6	350	373 2/6	396 4/6	420	443 2/6	466 4/6	493	513 2/6	536 4/6	560	23 2/6
29	28	96 4/6	120 5/6	145	169 1/6	193 2/6	217 3/6	241 4/6	265 5/6	290	314 1/6	338 2/6	362 3/6	386 4/6	410 5/6	435	459 1/6	483 2/6	507 3/6	531 4/6	555 5/6	580	24 1/6
30	29	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	25
31	30	103 2/6	130 1/6	155	180 5/6	206 4/6	232 3/6	258 2/6	284 1/6	310	335 5/6	361 4/6	387 3/6	413 2/6	439 1/6	465	490 5/6	516 4/6	542 3/6	568 2/6	594 1/6	620	25 5/6

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ing rise around or on either side, as the case may be. A tall chimney or tower of like proportions, built on such a foundation, if not made safe to a sufficient depth, would most likely become a "leaning tower," if not actually a falling tower. Probably the depth of a foundation in compressible ground ought not to be less than one-fourth the intended hight above ground—that is, for a shaft of 200 feet the foundation should be made secure to a depth of 50 feet. This could easily be done by piling or by well-sinking and concrete.

California Redwood.

The following particulars concerning the redwood of California, from one of our English exchanges will no doubt interest the readers of this journal:

The redwood forests of California extend along the western slopes of the Coal Range, from the Bay of Monterey to the northern boundary of the State. The redwood has already been practically destroyed in the neighborhood of San Francisco Bay, both north and south, but in other sections single trees capable of producing 75,000 feet of lumber are not uncommon, while a yield of from 1,000,000 to 2,000,000 feet of lumber per acre is by no means rare. The best authorities place the accessible redwood standing at about 25,825,000,000 feet. Redwood is fast coming into general use. A careful investigation shows that already it is used for mantels for houses, for counters, bookcases, desks, brackets, wainscoting, weatherboards, shingles, rustic moldings, cigar-boxes, coffins, tanks, posts, veneering, railroad ties, telegraph poles, foundations, flumes, wine and beer vats, and as a lasting wood it has no superior. It is easily worked and is susceptible of the highest polish. As the name indicates, it is of a dark reddish color. It is soft, coarsed-grained and very brittle. The grain usually runs very straight, and it splits readily, it being no difficult matter to split out a board 1 inch thick, 8 to 10 inches wide and 10 to 15 feet long. When dry it is much lighter than pine, spruce or fir, but of the logs cut from a newly-fallen tree the butt log will often go to the bottom like a stone, while the top logs will float like cork. It is of slow growth. Of timber now being cut the circles indicate that many of the trees have been standing thousands of years. The bark of the tree is very thick, soft and fibrous in character, and contains no rosin or pitch; hence fires that frequently run through the underbrush of redwood forests have no effect on the standing timber.

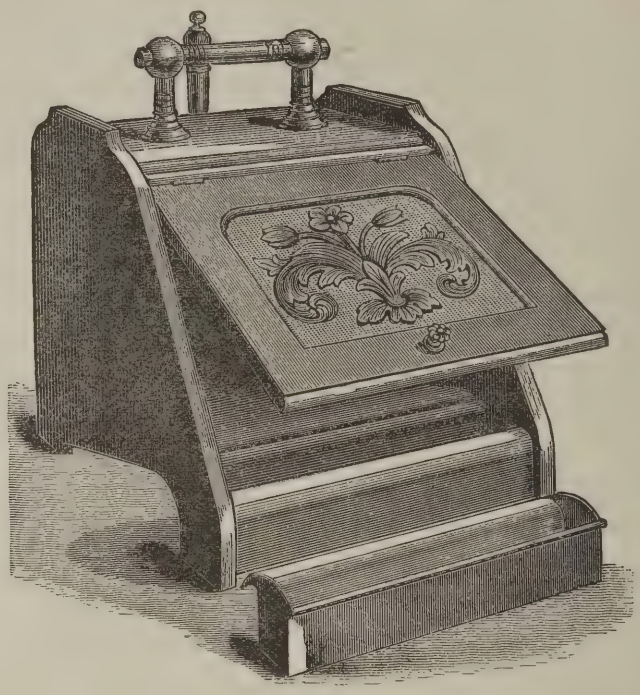
Sanitation of Dwelling-Houses.

At the recent meeting of the Sanitary Institute of Great Britain, held at York, Mr. J. Vickers Edwards delivered an address on "Sanitation of Our Dwellings," in which he treated the subject in a general manner without going into construction or other details. He glanced at the rapid strides made by sanitary science since the great fire of London, but, while admitting this advance, he urged that there still remaned a great deal to be done. "Local prejudice and self-interest have to be broken down, and the people gradually educated as to what is best for their welfare. Parents must be taught this, that unless they have healthy, clean, sanitary homes there is nothing but a series of domestic troubles in store for them." As a sort of general guide to housholders, Mr. Edwards set out seven points, which Dr. Richardson gives as an outline of general domestic sanitation, viz: "The healthy house must present no facilities for holding dusts or the poisonous particles of disease; if it retains one it is likely to retain the other. It must possess every facility for the removal of its impurities as fast as they are produced. It must be free from damp. It must be filled with daylight from all points that can be charged with light from the sun without glare. It must be charged with perfectly pure air in a steady charging current. It must be maintained at an even temperature and must be free from draft. It must be charged with a sufficient supply of pure and perfectly filtered water. A house possessing the advantages named under these heads cannot be far from a perfectly healthly house. It is a house in which disease will never be generated so long as it is kept up to its proper standard. It is a house in which disease, if it be introduced, will remain for the briefest possible period. It is a house which, after disease has left it, will admit of instant and complete purification." How these "happy results" were to be arrived at the speaker did not pretend to absolutely decide, but at any rate, looking at the divergences between localities and local authorities, he expressed the opinion that "it is not by the action of local authorities that sanitary science will progress, and it is not by a forced scheme of legislation we shall be successful. The masses must be educated to act for themselves, and sanitary officers appointed who can lay claim by qualification to such an important office, and men who will act fearlessly, impartially and with but one object in view, the health of their fellow-men." Mr. Edwards also urged that sanitary officers must be duly qualified men holding the diploma and certificate of the Sanitary Institute—without which no local authority should employ a sanitary officer.

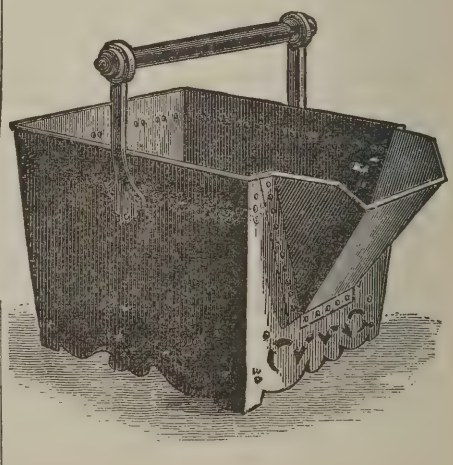
Writing upon the subject of chimneys, E. M. Shaw says: "For those parts of a chimney which are supported throughout stone may under some circumstances be admissible, but brick is always preferable for the purpose. The abutments of a chimney should be tied into the walls by wrought iron bars of sufficient number and strength, turned up and down at the ends and built into the jams for several inches on each side. No part of a flue should be of less thickness than half a brick, or 4½ inches. Where slabs of stone or slate are placed level with a floor before the opening of a chimney they should invariably be laid in sound mortar, cement or other incombustible and non-conducting substance, and it should be at a distance of not less than 4½ inches from the joists, flooring or any other woodwork. A chimney built only up to the roof and stopping at that point is always dangerous. Every chimney in a house should be perfectly distinct and separate from every other chimney, from the hearth to the external opening. Chimneys may safely be built in stacks, but they should on no account have any connection within the stacks. Brickwork around flues should not be less than 4½ inches thick in any part. By the Code Napoléon it was not permitted to build a chimney against the wall of an adjoining house without isolating it by an intermediate wall of sufficient thickness to prevent heat passing to the neighboring premises."

Attractive Coal-Boxes.

Some time since, in an article on this subject, we directed attention to the difference in fashions in coal-boxes between our own country and others, more particularly Great Britain. We presented on that occasion several designs of boxes, all being of the same general character, but differing in design and ornamentation. In the interval the same idea has been carried further, and among announcements of new goods by English manufacturers and dealers we find very attractive variations from the conventional pattern, one of which is presented in the first of the accompanying engravings. By reference to this design it will be seen that the fundamental principle of construction is different from that which prevails in this country. The coal is to be handled by a shovel, and there is nothing about it that suggests a bucket, or, in other words, something that is to be lifted up and emptied. Such coal-boxes as have been constructed in the past have been open to the objection of spilling more or less coal dust upon the carpet. The present device overcomes this by a well and tray placed near the front of the bottom, which catches any coal dust before it has a chance to drop



Wooden Coal-Box with Metal Lining and Tray.



Brass Coal Hod.

upon the carpet. The other features of the design do not differ materially from many others in the market, and therefore need not be specially described in this connection. The coal-box shown in the second engraving is very unlike the first in character and is unique in its way. It is made of metal, sufficiently heavy to support the weight of the receiver even when full of coal, and yet admit of perforations near the bottom for the sake of ornamental appearance. The spout is riveted in place, and some imitation fretwork is carried around the body near the upper edge in a way to increase the general effect. What appears to be a very massive handle extends across the top. This article, we understand, is made in brass, and when finely polished the bright surface of the brass, with the coal, makes a very handsome appearance at the fireplace. Both articles illustrated are from the establishment of Benham & Froud, Chandos street, London.

Tile Roofs.

One of our exchanges devoted to the tile and brick industry, commenting on tile roofs, offers the following remarks:

The greatest comfort experienced in living in buildings roofed with tiles instead of slates is universally acknowledged, for slate being, like metal, a great conductor of heat renders the room hot in summer and cold in winter. Slates are apt in cold weather with certain atmospheric conditions to cause condensation on their inner surfaces, and the moisture collects, runs down, and, lodging in the framework of the roof, causes decay of the lathing and timbers; tiles are not liable to these objections. Tiles for fire-proof covering are easy to use and inexpensive. They can be laid on hoop or iron wire rods instead of pantile laths, and when so done are practically indestructible. Slate, under the action of fire (and particularly if water be thrown on it when hot), cracks and flies in all directions, and the draft occasioned through the apertures thus caused increases the flame. Tiles, even when red hot, will still preserve the roof entire. Tiles have another superiority over slate. They are more picturesque, and when a roof is treated with ornamental and parti-colored tiles, as in Austria and Bavaria and parts of Holland, the effect produced is excellent, and it would be well to be in more general use, though within the laft few years they have been more commonly introduced.

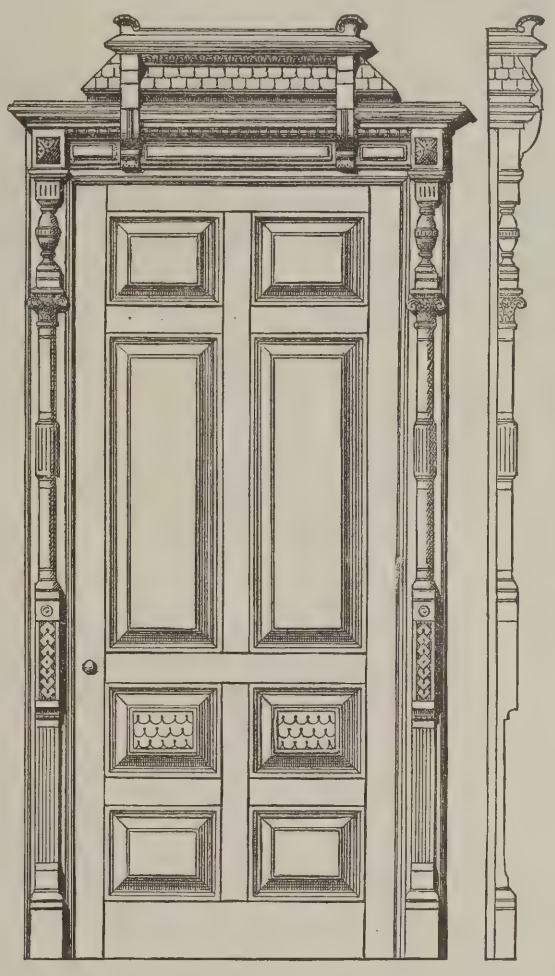
Women as Architects.

In the past we have referred to the occasional employment of women as architects, and we have mentioned that in the last competition conducted by *Carpentry and Building* there was at least one woman a contestant. Mrs. E. C. Hewitt, writing upon this subject, says:

Many avenues have been opened to women that were formerly closed, but there is one pre-eminently suited for woman which is as yet unauthorized with that sex. It seems to me that for women there is an excellent opportunity in architecture. There are a few women, it is true, engaged in the offices of architects, but the proportion, when considered in relation to the numbers employed in the other professions, as well as sciences, is small. One architect has been known to declare that he employed a woman assistant because she offered suggestions of such feasibility and practicability as no man could offer. To this profession, dealing so directly with "home" and its comforts and conveniences, woman is particularly well adapted. Woman holds the place of housekeeper and home-maker—why not let her combine the titles and become the "house-maker." Do not call her an architect if that title be too high-sounding or one of which the profession is jealous or belonging to something of a different order; give her some other title—create a profession for her. It is a case where the prejudice of man can militate very strongly against her advancement. Carpenters and masons will probably refuse for a long time to be "bossed by a woman." Nevertheless, in planning for the comfort of the household, woman may find wide scope for the exercise of her ingenuity and her knowledge of home necessities. Visit a man who has built a house for himself, notice the various conveniences and appliances, and see if two times out of three he does not say: "Yes, my wife wanted that. It saved so many steps, she said."

Door Trimming.

The accompanying design of door and door finish was prepared for this journal by R. Fischinger, No. 226 East 103d street, New York. The design has features about it that will be of interest to our readers, not only in the present shape, but on account of their adaptability to use in different positions.



Design for Door and Door Trimming, by R. Fischinger, No. 226 East 103d Street, New York.

Ebonizing.

One of the English furniture gazettes gives the following account of the French process of ebonizing:

One of the most ingenious as well as serviceable methods practiced by French artisans in wood is that by which is produced a complete resemblance to the color, beauty and density of ebony by the skillful use of charcoal upon the surface. None but carefully selected woods of close and compact grain are employed for this purpose, and these are covered in the first place with a coat of camphor dissolved in water, and almost immediately after with another coat composed chiefly of sulphate of iron and nutgall. The two combinations in blending penetrate the wood and give it an indelible tinge, and at the same time render it impervious to the attacks of insects. On these two coats becoming sufficiently dry, the surface of the wood is rubbed at first with a very hard brush of couch grass and then with charcoal of substances as light and friable as possible, the fact being that if a single hard grain remains in the charcoal it will scratch the surface, which should be perfectly smooth. The flat parts are rubbed with natural stick charcoal, the indented portions and crevices with charcoal powder, and, alternately with the application of charcoal, the article operated upon is rubbed with a flannel soaked in linseed oil and turpentine. These pouncings, repeated several times, cause the charcoal powder and the oil to penetrate the wood, insuring a beautiful color and a perfect polish.

Scaffolding.

In giving a general account of the use of timber scaffolding, Mr. T. Grissell writes as follows: In adopting the principle of timber scaffolding for buildings in preference to poles and ropes Messrs. Grissell & Peto, the contractors, were influenced by considerations of saving both time and expense. They had long been impressed with the want of scientific principle exhibited in the ordinary scaffolding. The system had been employed in rather a rude form by Mr. Tomkinson, of Liverpool, in his quarries and stone-yards, for moving stones of large dimensions. Scaffolding of a somewhat similar kind was used in the erection of the Arc de Triomphe, Barrière de l'Etoile, and at the Eglise de la Madeleine, at Paris. The first time it was used by Messrs. Grissell & Peto was for the erection of the Reform Club (Pall Mall), under Mr. Barry, in 1838; then at the large graving dock at Her Majesty's Dockyard, Woolwich, under Mr. Walker, in 1832, and it was employed very extensively at the new Houses of Parliament. In these constructions its general applicability was proved, and in the erection of the Nelson Column (commenced in 1840), where it was carried up to the hight of 180 feet, its stability at a considerable elevation was fully tested. Its usefulness is manifested by the facilities which it affords to the workmen, particularly in buildngs of stone. By its aid and with the traveling machine at its summit one mason or "setter" can set as much work in one day as was formerly done in three days, while at least six laborers are dispensed with, who, with the old mode of scaffolding, were always required to be in attendance. It is also well known that scaffolding poles and cords are not only expensive, but are subject to rapid decay, and after a few years' wear become useless; in fact, the scaffolding of a moderately extensive building costs a large sum when first purchased, but it is almost valueless after a comparatively short period of time. Such is not the case with the timber scaffolding, which may be said to be of no greater cost to the contractor than the expense of its erection. It is not secured together by either bolts or spikes, so that the waste is trifling, and after having performed its duty as a scaffold it may be removed piecemeal into the building at the level of each floor, and be used directly for constructing the roof and the internal carpentry of the structure. The timber having been seasoned by its exposure to the weather is consequently better fitted for immediate use.

The Government committee charged with public buildings and grounds decide that a new building in New York is necessary to meet the increasing demands of the Custom-House. The inadequate accommodations of the appraiser's department impose needless expense. Rents now paid amounting to $80,000 might be saved by erecting another structure.

NOVELTIES.

Perfection Screw Holder and Driver.

The Hale Mfg. Company, Minneapolis, Minn., are putting on the market this article, which is represented in the accompanying illustrations, Fig. 1 giving a front

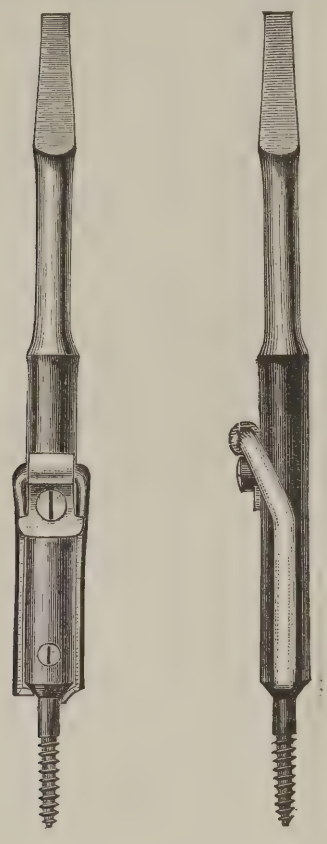


Fig. 1.—Front View. Fig. 2—Side View.

Novelties.—The Perfection Screw Holder and Driver.

view of the tool and Fig. 2 a side view. It will be perceived that this screw holder and driver is used with a brace, and consists of a shank with a clasp attachment. The end of the shank is flat and slotted so as to receive the bit, which is inserted and held in place by a screw, shown in Fig. 1. This bit is described as of fine quality tool steel and projects only far enough to engage the screw slit, permitting the flat face of the screw-head to rest upon the flat end of the shank, so that in using the tool the screws have the position represented in the cuts. The clamp, it will be perceived, is attached to the shank by means of a loop in which it swings, being pressed over the beveled sides of the screw-head, thus holding the screw very firmly in place. By the larger screw it will be seen that the position of this clamp can be slightly altered so as to adapt it to larger or smaller sized screws, as may be necessary. As shown in Fig. 1, this clamp has one side slightly longer than the other, and pointed. The object of this device is that this spur or point may be engaged in the wood when the screw is driven nearly home, so as to detach the clamp and throw it back out of the way. It is stated that in use this will be done so that the clamp will fly back with considerable force and engage the shank of the tool, where it will remain until it is desired to insert another screw. It may be added that the flat end of the shank contains a round beveled hole or socket about ⅛ inch deep, through the middle of which the bit extends. This is to allow a round-head screw to drop in, thus permitting it to be held the more securely. This ingenious tool is 6 inches in length, nickel plated, each one being put up in a separate box. The manufacturers call attention to its advantages as holding a screw perfectly, letting go of it perfectly and driving it perfectly, and requiring no hammer or other tool in connection with its use.

A New Pony Planer.

Witherby, Rugg & Richardson, of Worcester, Mass., are turning out a new pony wood planer, or Panacea Surfacer, as they call it. It is claimed to be the latest and best of the many similar machines put upon the market throughout the country, substantial and strong at every point and of the very best material and workmanship.

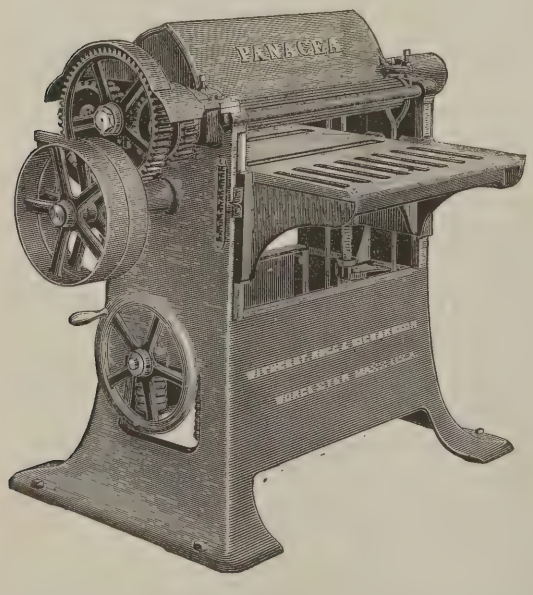


Fig. 3.—New Pony Planer, Built by Witherby, Rugg & Richardson, Worcester, Mass.

The machine is shown in the cut, Fig. 3. The table or bed is cast in one piece and so jibbed to the frame that it can be always kept firm and solid without trouble. It has two top feed rolls geared together, and two under anti-friction rolls in the table, all easily adjusted and kept in proper position. The cutter cylinder carries two cutters and is made from a solid cast-steel forging and finished in the most approved form for doing the finest surface planing on any and all kinds of lumber from 0 to 6 inches in thickness and 24 inches wide, with a scale and indicator convenient to the eye of operator when changing thickness. It has on each side, close to the cylinder, a pressure bar both adjustable and self-adjusting for variation of thickness of stuff being worked long or short. Every machine is put under belt, adjusted and tested with work until it proves satisfactory in every respect, and is ready for business as soon as properly set up, belted and power applied by the purchaser. In this machine great care has been taken to so arrange all the parts as to produce results in the most economical manner.

The Steel Nickel Barn-Door Hanger.

The Ohio Butt Company, Morris, Ill., and 55 Dearborn street, Chicago, have recently added to their line of Nickel hangers the one represented in the illustration, Fig 4. The frame is described as of first-class Bessemer channel steel of one piece throughout, bent while hot and securely

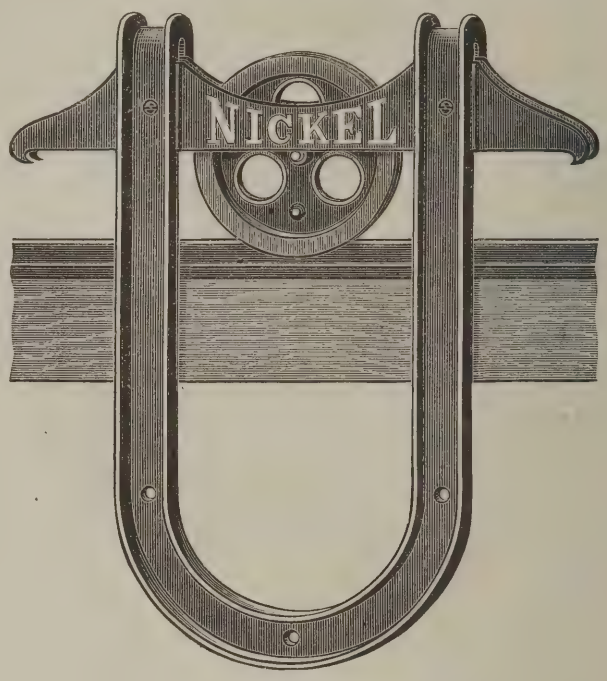


Fig. 4.—The Steel Nickel Barn-Door Hanger.

riveted to malleable iron rider bars, which are braced and provided with ribbed recesses to receive the frame. The company direct special attention to the fact that this is a ribbed steel hanger, and allude also to the form of bars for the frame as permitting the necessary strength and stiffness without any appearance of clumsiness. The result of this construction is stated to be that the hanger is as firm as if forged from one solid piece of metal.

Stanley's Bit and Square Level.

Boring with precision is one of the every-day requirements of mechanics in the various wood-working lines. Just how to accomplish this feat, however, is something

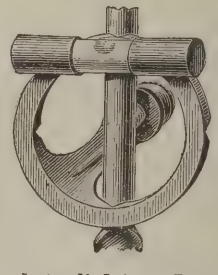


Fig. 5.—Level Applied to a Bit for Boring Vertically.

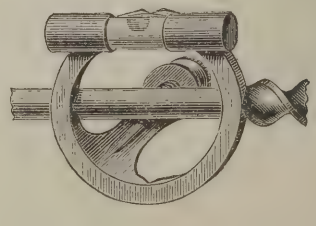


Fig. 6.—The Level Applied to a Bit for Boring Horizontally.

which mechanics do not find so easy to determine in all cases. The device shown in two applications in Figs. 5 and 6 is a very satisfactory answer to the question. The device shown is also serviceable as an attachment for framing squares, try squares and other similar tools, converting them into fair substitutes for the or-

dinary spirit level. A test of the merit of an article is often found in the inquiry, "Why did not somebody think of that before?" The device shown in the cuts referred to suggests this question to every mechanic who has attempted to bore holes

Novelties.—Fig. 7.—The Snyder Strain Scroll Saw.

vertically or horizontally, and has been troubled to find some convenient means of accomplishing this end. The article is so simple that a description of it is scarcely necessary. The frame of the level has three pairs of V-slots on its back edges. The shank to a bit will lie in these slots, either parallel to the bubble glass or at an exact right angle with it, or intermediate between the two—that is, at an angle of 45°. A thumb-screw secures the level to the bit in either position, and accordingly the boring can be done with perfect accuracy as to perpendicular, horizontal or angle of 45°, simply by watching the bubble glass while turning the bit. This article is being put upon the market by the Stanley Rule and Level Company, 29 Chambers street, New York City.

The Snyder Strain Scroll Saw.

A scroll saw that the manufacturers claim takes the lead for durability and fast cutting is shown in Fig. 7 of the engravings. It is known as the Snyder Strain Scroll Saw, and is manufactured by the Battle Creek Machinery Company, Battle Creek, Mich. With reference to the speed at which it can be run, the statement is made that it is capable of from 1600 to 1800 revolutions per minute. The strain consists of a white-ash bow, with rawhide string attached to the bow by means of leather loops and light steel hooks. The construction is such that the strain responds almost instantly to the movement of the crank, and being very light makes no jar. The absence of friction on the strain and the lightness of the crosshead avoid all jarring, even when the machine is run at the high rate of speed of 1600 revolutions per minute. Accordingly the makers inform us that the machine can be run in the second or third stories of any factory without shaking the building. The adjustable slides below the table are of the best gun metal, and are provided with self-oiling globes. The crosshead which works in these slides is of solid forged steel. Among the advantages claimed for this device, the makers state that changing from inside to outside work is much quicker accomplished with it than with any other strained or unstrained saw. The operator passes the end of the saw through the table until it strikes a steel plate, from which it slides into the crosshead. It is asserted that it is impossible for the saw to miss catching. The machine has a brake and shifter combined, by which it may be stopped instantly. The machine is well built, and we understand that each one is tested and tried in the works of the manufacturers before being shipped.

The All-Steel Screw Drivers.

Paine, Diehl & Co., Philadelphia, are manufacturing a line of screw-drivers consisting entirely of steel, which are represented in the accompanying cut, Fig. 8. The handles are made as shown in the cut, or with an eye or loop in the end, and the blades are of different lengths, but the same general principles of construction are carried out in all of them. The obvious point is made in their favor that they are so made that there is no danger of a blade turning in the handle, as is often the case with the ordinary line of screw-drivers, and to obviate which so many devices have been resorted to. It is also claimed that as these screw-drivers are made the strain is evenly distributed over its entire length of handle, thus preventing the edge of the blade from turning up when not used above the strain named for the size taken. The manufacturers, who have imported an extensive plant for the manufacture of these goods, call attention to the accuracy with which they are made and to the quality of steel used in their manufacture. Each screw-driver is tested before leaving the works the catalogue giving, in connection with the sizes and prices of the goods, a statement of the pressure at which each size has been tested. The screw-drivers are made of steel from $\frac{1}{8}$ to $\frac{5}{16}$ inch, and in ordinary double, or triple lengths. It is pointed out that the eye in the eyed screw-drivers serves to insert a lever of any sort for obtaining additional pressure if required.

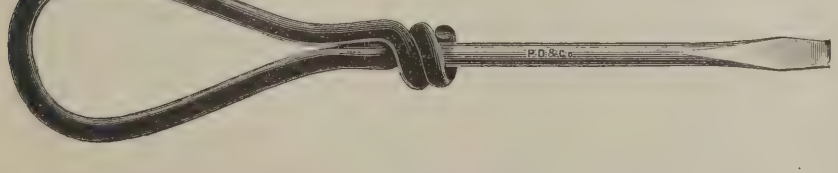


Fig. 8.—Paine, Diehl & Co.'s All-Steel Screw-Drivers.

A New Spoke-Shave.

The Birmingham Mfg. Company, Birmingham, Conn., are putting on the market a new line of spoke-shaves, one of which is shown in the illustration herewith given.

Fig. 9.—Double Iron Spoke Shave with Attachment.

It represents their Patent Double Iron Combination Spoke-Shave. The cap is described as cutting in the same manner as the double cutter to a plane. The illustration shows it with patent attachment chamfering gauge. The company's line includes single as well as double iron spoke-shaves.

Victor Bevel Protractor.

This article is put on the market by the Victor Mfg. Company, Athol, Mass., and is designed to meet the demand of tool-makers

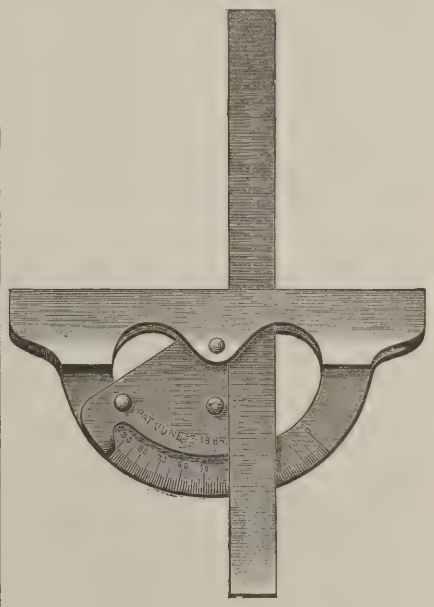


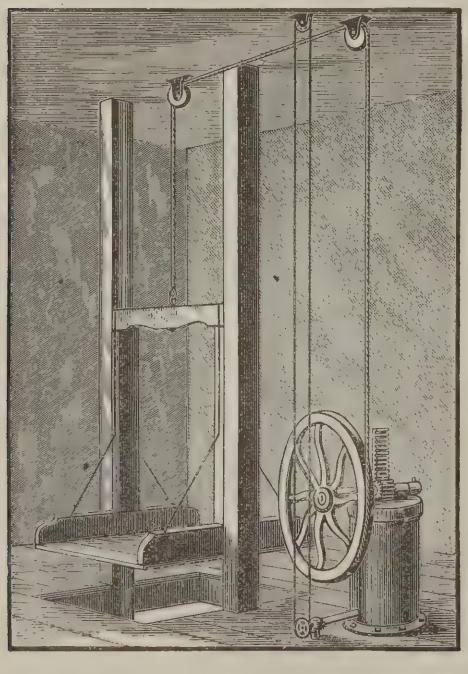
Fig. 10.—The Victor Bevel Protractor.

and machinists for a light, convenient and accurate instrument for obtaining and transferring angles. It is illustrated in the accompanying cut. The blade swings between the two working faces of the head or stock, and when clamped at any degree the angle may be set off to the right or left without any further adjustment, by simply turning the tool over. By means of the index point and divided quadrant the blade may be set at any angle from 0° to 90°, and firmly clamped. The blade slides its full length on the working face of the sector, thus giving a long bearing surface, and not liable to wear. The blade may also be drawn back, leaving the face of the head clear for use on surface plates, and on platens of planers for setting the head at any angle, which is referred to as a valuable feature. An extra

blade, 3 inches long and brought to a point by beveling off one side at an angle of 30°, is included with the tool, and is alluded to as convenient for inside dovetailing. Attention is called to the fact that, instead of setting the index point at the center of the division mark, this tool is adjusted so as to show the full size of the mark forward of the index. The quadrant, it will be observed, is divided to degrees. This tool is made entirely of steel, bright polished all over, weighs 4 ounces, and is referred to by the company as durable in every part, and sold as low as the quality of the tool will admit. It is made in two sizes, 6 and 9 inch, which are furnished either polished or nickel-plated, as desired.

A New Hydraulic Hoist.

The accompanying cut, Fig. 11, represents a hydraulic hoist manufactured by Maynard & Marsh, 12 Cortlandt street, New York. The hoist is especially adapted for dumb waiters and light elevators, but is also suitable for heavier lifting. It is made in a number of different sizes, with cylinders ranging from 8 to 24 inches in diameter, having a load capacity of from 300 to 2700 pounds. The hoist is made in two styles, the one shown in the cut being used where the available water pressure is sufficient to operate it. The contrivance is simple and needs but a brief explanation. The cylinder shown contains a rubber-packed piston which carries a rack in place of a piston rod. The rack gears with a pinion, the shaft carrying a pulley with a grooved face in which runs a wire rope connecting with the hoist. The small valve shown at the bottom of the cut regulates the supply of water to the cylinder. When opened the water enters the cylinder below the piston, which, being forced up, raises the hoist. A second position of the valve closes the cylinder and holds the hoist in whatever position it was stopped. Turning it further opens an outlet, and as the water runs out the piston and hoist descend. Where no pressure of water is available, or where the pressure is only a few pounds, the hoist is provided with two cylinders, the second one placed on the floor below, having a steam-pipe connection. The lower cylinder has a pipe connection from its top to the bottom of the cylinder above. Within the cylinder is a loose piston which is a non-conductor of heat. The lower cylinder being filled with water, steam is admitted below the loose piston through a pipe connected at the bottom. The piston rises and forces the water above it into the upper cylinder, where the effect



Novelties.—Fig. 11.—A New Hydraulic Hoist.

is the same as if water under pressure were taken directly into the cylinder. When the hoist is lowered the water returns to the lower cylinder, and as none is lost during the operation a single charge of water will last indefinitely. Where the water and steam cylinders are thus combined the valves of the two are connected so as to operate in unison. The hoist, as we have said, is made in various sizes, and can also be adapted to any reasonable hight.

Acme Circular Saw.

The Seneca Falls Mfg. Company, Seneca Falls, N. Y., have recently introduced a foot and hand power circular saw, called the Acme, an illustration of which is presented in Fig. 12 of the engravings. The makers claim for it the most powerful treadle motion ever offered with a circular sawing machine, consisting of double foot treadles with a walking motion, which enables the operator to use both feet sitting, or one foot standing, as may be desired. By examination of the engraving it will be seen that the power is transmitted from a large gear on the driving shaft to a small gear on the saw arbor, through an intermediate gear on the crank-shaft. The latter carries a heavy balance-wheel which gives it a momentum producing a strong and positive power without any slipping or lost motion. All the gears are carefully cut and run smoothly. The machine is also provided with a crank motion for hand-power, useful in ripping long pieces, &c. Should occasion require, a pulley can be readily attached to the crank shaft for steam-power. Saws from 5 to 10 inches in diameter may be used on this machine. The saw arbor runs in self-oiling conical bearings which are made adjustable, so as to take up the wear. The table is made from alternate strips of cherry and maple and is provided with adjustable gauges. It is hinged at the back, so that it can be raised or lowered. For this purpose a hand-screw is provided in front. This adapts the machine for rebating, grooving and the like. The makers recommend this article as a strong, substantial and thoroughly-built machine suitable for either light or heavy work and designed for the practical use of carpenters, builders, cabinet-makers, pattern-makers,

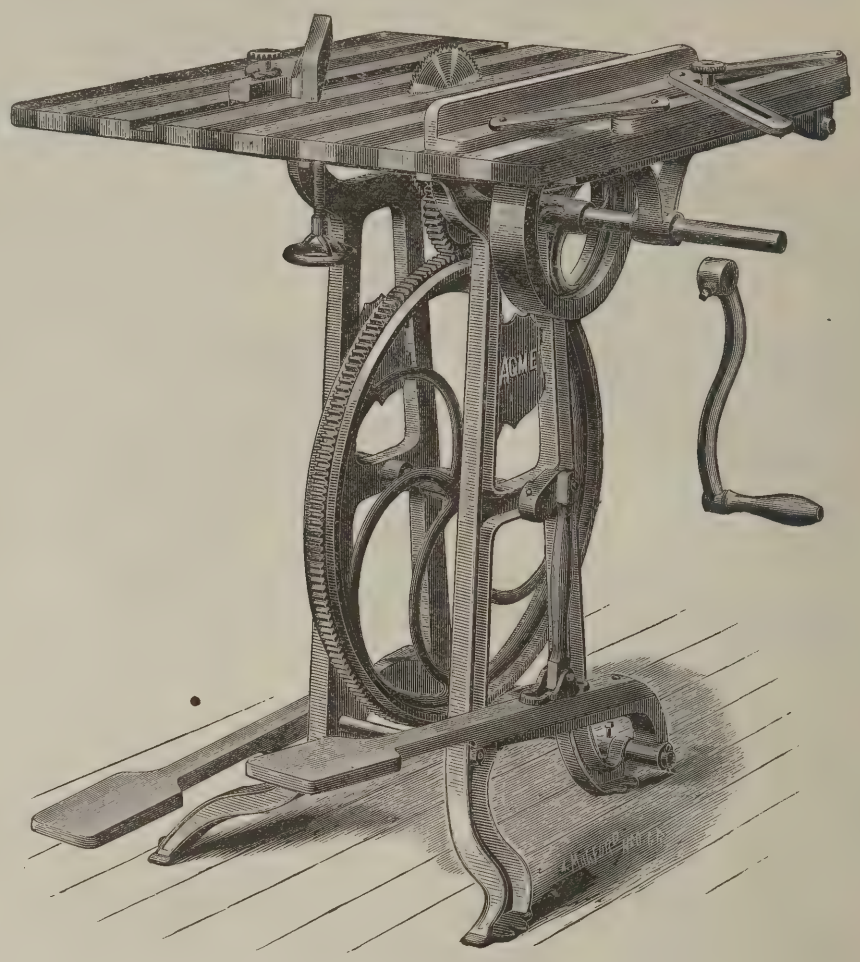


Fig. 12.—Acme Circular Saw.

picture-frame makers, box-makers and all wood-workers who do not have steam-power.

Adjustable Clapboard Marker.

The Stanley Rule and Level Company, of New Britain, Conn., and with New York office at No. 29 Chambers street, are offering to the trade an adjustable clapboard marker, the general features of which will

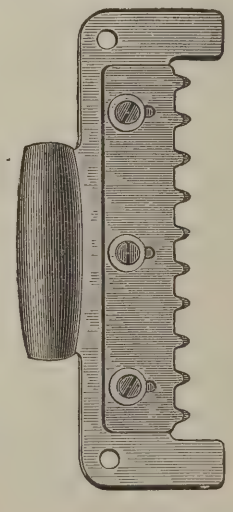


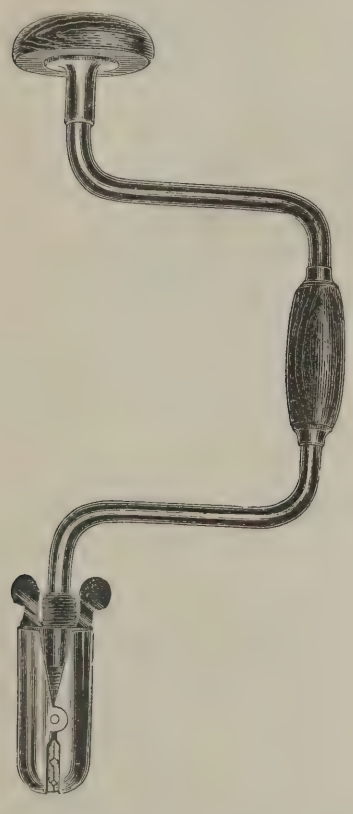
Fig. 13.—Adjustable Clapboard Marker.

be understood by reference to Fig. 13 of the engravings. This tool is so constructed that it can be used with one hand, while the other is used for holding a clapboard in position. The marking blade is properly slotted, so that the tool can be adjusted to any thickness of board. The sharp edge of the teeth on the marking blade are just parallel with the outer edges of the legs when placed against

the corner-board. By moving the tool half an inch when in this position it will mark a full line across the clapboard, exactly over and conformed to the edge of the corner-board. By its use, therefore, there is no difficulty in sawing for a perfectly close joint.

Globe-Jawed Bit Brace.

Amidon & White, 135 Main street, Buffalo, N. Y., are just introducing a new bit brace, the peculiarities of which are in the chuck or device for grasping the bit. By reason of its shape the part is described as "globe-jawed." It is clearly indicated in Fig. 15 of the engravings, which repre-



Novelties.—Fig. 14.—Globe-Jawed Bit Brace.

sents a vertical section through the jaw. The jaw is operated by means of a winged nut which serves by means of a wedge to close the jaws, which are pivoted nearly midway of their length. The front of each jaw is provided with a half-sphere grooved so as to fit around the shank of the bit. Each half of the sphere fits in a cup-like shape given to the end of the jaw, and the grooves are made in sets of different sizes. Accordingly the parts are turned in order to secure the size of groove necessary to fit the bit that is to be used.

Fig. 15.—Detail of Gripping Device.

Both bits and drills can be used in the same jaw, and irregular pieces of metal if desired are likewise firmly held. The bit may be inserted as shown in the sectional view, or it can be held by the globe device alone in case the full length of the bit is wanted for boring. The makers claim that this is the most complete brace ever made. It is simple, substantial and quickly operated. It will hold the largest shank bits down to the smallest drills, whatever may be the shape of the shank, including round, square or tapering. Each shape secures the "screw-lever-and-wedge" grip which the device provides. The article is made both plain and with ratchet attachment. It is manufactured in four sizes, viz, 8, 10, 12 and 14 inch sweep. The tool is handsomely made and is fully nickel-plated. The sweep is of steel, the head is of lignumvitæ and the handle of cocobola.

Universal Power Screw-Driving and Boring Machine.

Micajah C. Hurley, of Richmond, Ind., is directing attention to a new labor-saving device illustrated in Fig. 16. The apparatus is designed for boring or drilling in wood or iron and for driving screws and screwing on small nuts where it is required to accomplish such work rapidly and

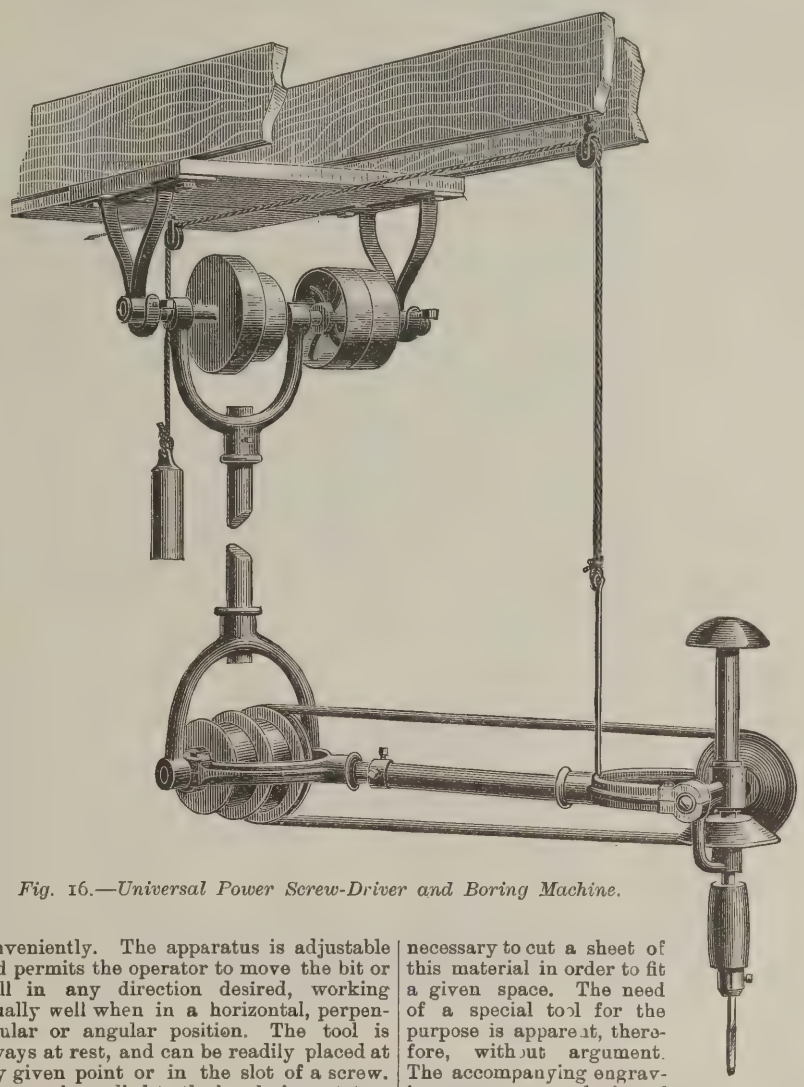


Fig. 16.—Universal Power Screw-Driver and Boring Machine.

conveniently. The apparatus is adjustable and permits the operator to move the bit or drill in any direction desired, working equally well when in a horizontal, perpendicular or angular position. The tool is always at rest, and can be readily placed at any given point or in the slot of a screw. Pressure is applied to the hand-piece at top, which forces the two beveled friction wheels together, driving the screw or boring rapidly or slowly according to amount of pressure that is applied to the hand-piece. The pressure being applied by the hand is readily controlled, the manufacturer claiming that one man is enabled to do the work of four working by the ordinary method. Referring to the engraving it will be seen that the tool or screw-driver, as the case may be, is counterbalanced, and that the joints between the several parts of the device are such as to enable it to be turned in any direction and the drill or screw-driver driven at any angle whatsoever. Four sizes of these machines are being manufactured, adapted for different purposes.

Corrugated Iron Cutter.

All those who are accustomed to working corrugated iron are acquainted with the difficulties that are encountered when it is necessary to cut a sheet of this material in order to fit a given space. The need of a special tool for the purpose is apparent, therefore, without argument. The accompanying engraving represents a device of this kind which has recently been perfected by the Scribner-Libbey Company, of St. Paul, Minn. In principle the machine resembles the double cutting hand shears with which some of our readers are familiar and which prove so useful in cutting stove-pipe and other cylindrical forms. The bed of the machine, or rather the lower cutter, consisting of two parallel blades, is serrated to correspond to the corrugations. The upper blade is practically straight, but for the sake of the leverage obtained, and for giving a better shearing cut, is slightly bowed near one end. The operation of the machine is simplicity itself. The sheet of iron to be cut is laid upon the bed, the corrugations fitting into the grooves in the lower blade. By means of the handle the upper blade is then made to descend, cutting through the corrugated sheet and throwing out a narrow strip equal in width to the thickness of the upper blade. The device is very effective, and was gotten up in connection with the work of the company named, and is considered by them very valuable. We have had the pleasure of examining its operations and can bear testimony to its efficiency. The machine is so arranged as to permit the

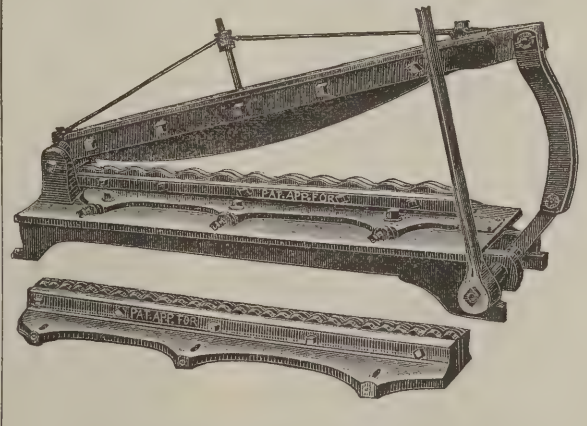
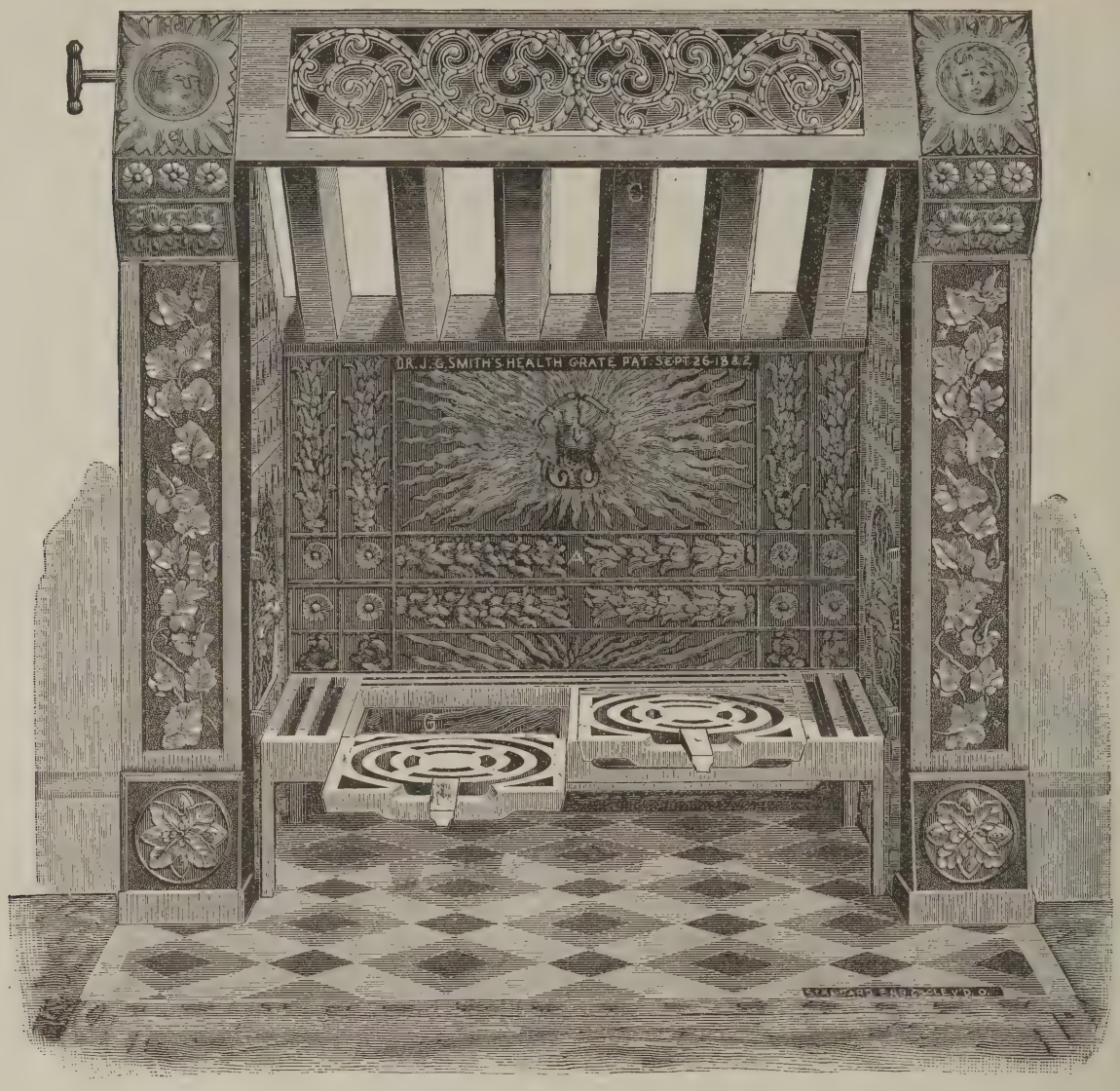


Fig. 17.—Shear for Cutting Corrugated Sheets.

substitution of special blades on the lower bed, thus adapting it to cutting sheets the corrugations of which are of different dimensions. The upper blade remains the same in all cases. It is easy to see how special forms could be made so as to cut sheets obliquely, were any amount of that kind of work required. The machine is not so heavy but that it can be easily transported, and is very conveniently used about the building upon which the material is to be placed.

Fireplace Furnace.

The Omega Stove and Grate Company, Cleveland, Ohio, are putting upon the market a form of fireplace heater which possesses unique features. A general view of the apparatus, with the fender and front portion of the grate removed, is shown in Fig. 18. From this it will be seen that the grate is provided with a special form of shaking and dumping device that will be appreciated by all who have used the ordinary form of grates, and have been troubled by the difficulty of disposing of clinkers or shaking the ashes from one portion of the fire without disturbing the other parts. The grate is made to withdraw in sections, as shown at the left in the cut, and each part is provided with a shaking arrangement the details of which somewhat resemble the ordinary coal stoves with which our readers are very generally familiar. A special feature of the apparatus is the introduction of warm fresh air. The back of the grate is arranged as shown in Figs. 19



Novelties.—Fig. 18.—Smith's Fireplace Furnace, with Shaking and Dumping Grate.

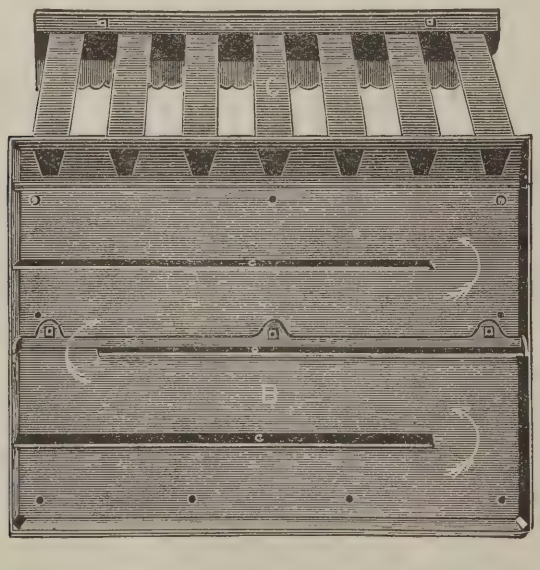


Fig. 19.—Back View of Furnace with Plate Removed.

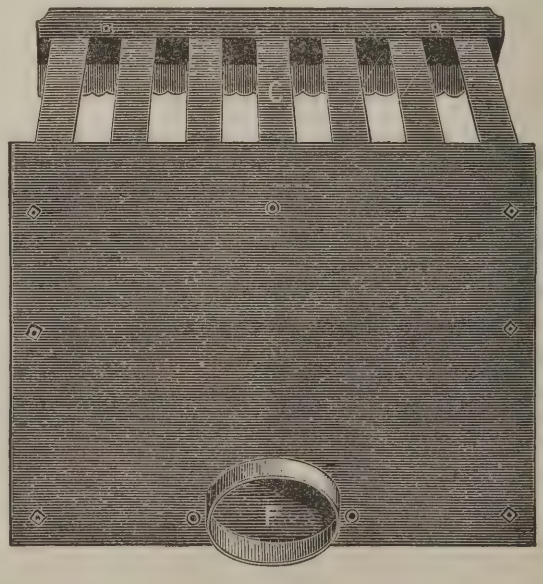
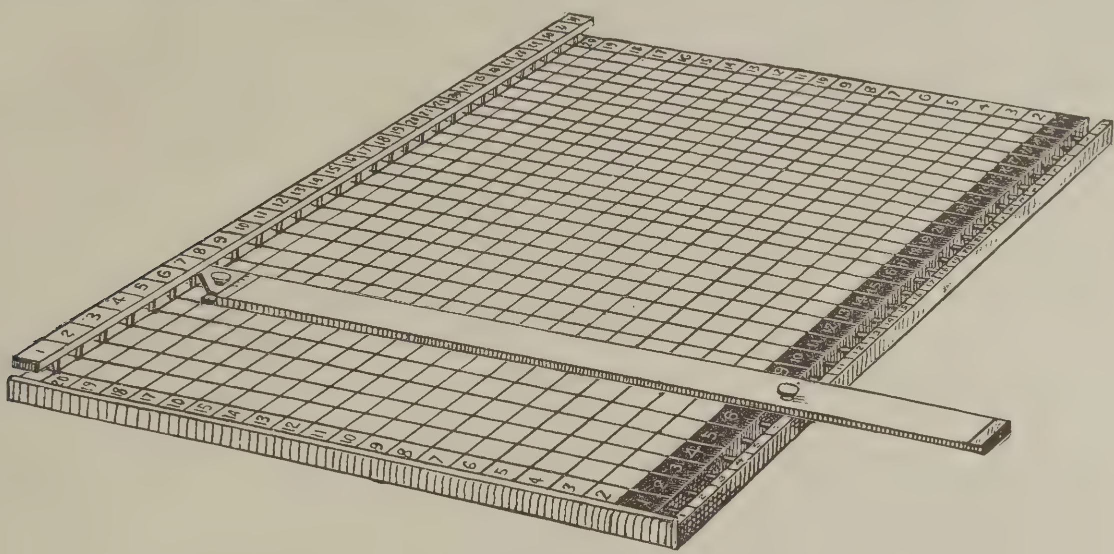


Fig. 20.—Back View of Furnace Containing Fresh-Air Inlet.

and 20. The first of these show the back plate removed, and indicates the course of the fresh air in passing from the entrance shown in Fig. 18 to the room. It has a horizontal travel back and forth through the spaces, as indicated by the arrows, of some 15 feet, and finally enters the room by means of the top flues and the register shown in Fig. 18. The air in passing through the apparatus becomes very comfortably heated, in fact, attaining a very high temperature where there is a large bed of coals. In this way a great amount of heat is utilized which would otherwise be lost, and at the same time the room in which the apparatus is situated is furnished with a large supply of fresh air The air supply may be cut off at will by means of a register provided, the handle for operating which is shown at the left in Fig. 18. This does not cut off the entire openings, but leaves enough to maintain circulation, thereby avoiding danger to the apparatus by reason of overheating. The patterns which are employed in the manufacture of this heater have been tastefully designed by one of the most eminent pattern-makers in the country, and the apparatus is a desirable addition in the furnishing of any room. Two sizes are manufactured, one measuring 22 inches, for ordinary dwellings, and the other 26 inches, for offices and rooms of larger size. In the circular which the company have issued attention is directed to the fact that this heater readily fits into any fireplace without changing or defacing the mantel. Several different styles of front are manufactured, varying the price from a very moderate sum to a figure affording something that is quite elaborate. The makers claim for this apparatus a larger heating capacity than is afforded by any of the ordinary grates in the market.



Novelties.—Fig. 21.—The Perfection Glass Board.

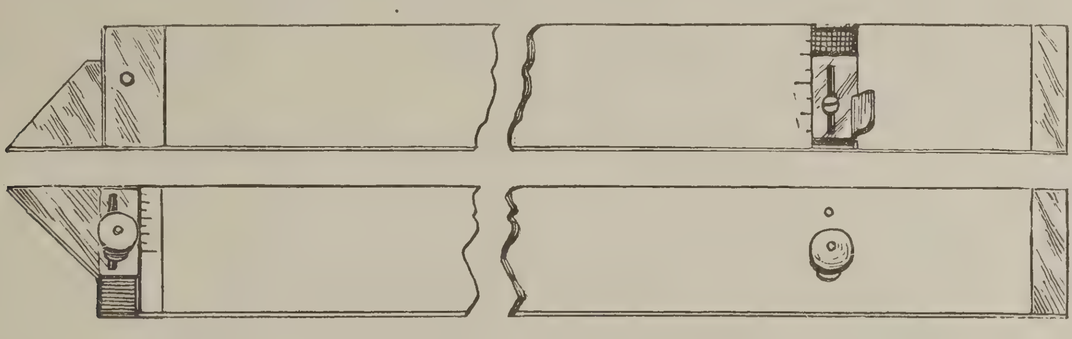


Fig. 22.—Rule for Perfection Glass Board.

The Perfection Glass Board.

The Lufkin Rule Company, Cleveland, Ohio, and 115 Dearborn street, Chicago, are manufacturing a new glass board called the Perfection, which is illustrated in the cuts, Figs. 21 and 22, given herewith. The board is thus described: It is made of well-seasoned hardwood and of several pieces, and will remain, it is claimed, always true. It is ruled from side to side both ways, dividing the board into even inches. At the top is a series of perpendicular pins, one for each inch, and at the bottom a corresponding series of horizontal pins. The rule, as shown in Fig. 22, is provided at each end with a aterally adjusted gauge. When even sizes are to be cut these gauges are brought even with the right-hand side of the rule, the wedged-shaped point is inserted between the perpendicular pins, and the plug at the other end of the rule is dropped between the horizontal pins at the desired inch. This holds the rule firmly on the line, allowing for the width of the diamond. Or, to illustrate how the fractions of an inch are obtained, suppose a light of glass is to be cut 35⅜ inches in length. The movable gauge at each end of the rule is first adjusted by loosening the thumb-nuts and moving each one back from the right hand edge exactly ⅜ inch by the gauge marks provided for the purpose. These are held again securely in place by tightening the nut. By inserting the points of the rule at the 35th inch the right-hand edge of the rule will be brought to the proper place by which to cut the glass exactly 35⅜ inches in length. The board is made of the following sizes: 24 x 36, 30 x 48, 36 x 54, 42 x 60, 48 x 72. The manufacturers allude to the advantages possessed by this board, especially on account of the facility with which odd sizes are cut, and allude to it as insuring accuracy, saving time and preventing breakage. They also furnish tables with lock drawers for diamond, glass, lists, &c., with the Perfection top.

Circumference Rule.

Sometime since we mentioned that Wm. H. Clark, of Thomaston, Conn., was arranging to put upon the market a circumference rule. We now have the pleasure of laying before our readers a reduced *fac simile* of the rule, Fig. 23, from which its features will be readily understood. The drawing is one-quarter full size. Along one edge of the rule, which would be the bottom of the cut, the subdivisions are by inches and by eighths of inches. On the opposite edge of the rule is given the circumference of inches and quarters of an inch in diameter. The way in which the rule would be used will be understood from a very simple example: Required, the circumference of a pipe 5 inches in diameter. The required distance is indicated by 5 on the beveled edge of the rule or the upper edge in the cut. Supposing for further illustration the circumference of a circle 3½ inches in diameter is required, it is only necessary to take the space 3½ on the upper edge of the rule. The circumference of 2⅛ inches would be correspondingly taken 2⅛ on the beveled edge of the rule. From this it will be gathered that the two edges of the rule are divided in such a way that the subdivisions appear in the ratio of the diameter to the circumference. In other words, of 1 to 3.1416. Such an instrument as this is of great usefulness in shops and wherever calculations of the kind to which it is adapted are required to be made. The rule is in form similar to the ordinary desk rules with which many of our readers are familiar. The beveled edge is re-enforced by a piece of brass, and the opposite edge is molded in a way to facilitate ruling with a pen.

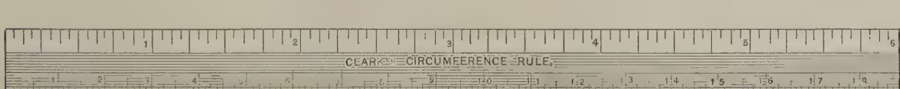


Fig. 23.—Clark's Circumference Rule, One-Quarter Full Size.

Prof. D. T. Ames, editor of the *Penmen's Art Journal*, 205 Broadway, New York, has just brought from the press a new penmanship work entitled Ames's "Copy Slips for Self-Instruction in Writing." It comprises 33

movable copy slips, beginning with movement exercises and graduated progressively, covering the entire range of practical writing. In addition to plain business writing are alphabets of engrossing script (with examples of the same as used) old English and German text, Roman, italic and gothic; also examples of brush-marking. A separate sheet contains intructions to the student that are thorough and sufficiently explicit to be readily understood by any person of ordinary intelligence. The copies are excellent writing models, and are well printed on heavy plate paper. This work is eminently adapted to the needs of persons who wish to acquire a good handwriting without the expenses of personal instruction.

TRADE NOTES.

THE CATALOGUE of the wood-working machinery issued by W. A. Heath, of Binghamton, N. Y., is a pamphlet of 60 pages of the usual size. The engravings occupy the left-hand pages, and the letter-press faces them. A very complete line of wood-working machinery is shown, together with a number of specialties. In addition to the goods shown in the book Mr. Heath builds machinery to order and to specification to meet special requirements. A page of the pamphlet is devoted to rules for calculating the speed of drums and pulleys.

WE ARE INDEBTED to G. M. Braderick, architect, Montpelier, Ohio, for drawings of the trimmings used in the residence of Jacob Vernier, at Archbald, the same State. The trimmings are quite elaborate in character, the architraves having round molded corners and rosette panels midway of their length.

A CIRCULAR bearing date December 1 announces the dissolution of the partnership heretofore existing between Chas. N. Vandervoort and Wm. G. Tucker, under the firm name of Vandervoort & Tucker, and the continuation of the business by Wm. G. Tucker, who assumes all liabilities and collects all money due the old firm. The business in question is cements, paints, &c., a specialty being a roofing cement for repairing leaks. The location of the business is 116th and 117th streets, East River, New York.

GUMMY, SPERING, INGHRAM & Co., of Philadelphia, are directing the attention of architects to the several brands of tin plates of which the company make specialties. These include Penn Old Method and and Pontymister Old Style. They offer samples to all applicants. They are also directing attention to the Patten metallic shingles, which they manufacture, and for which many special advantages are claimed.

LUTHER R. KELPER, wholesale and retail dealers in builders' hardware, Harrisburg, Pa., solicits correspondence with builders concerning supplies of hardware for their buildings. Paints, oil, glass, &c., are included in the output of this establishment.

LEWIS F. PARKS, 272 Colerain avenue, Cincinnati, Ohio, invites the trade to send for circulars of his feed-power mortising and tenoning machine combined. This device has many interesting features, all of which are described in Mr. Parks's circulars.

POST & Co., No. 152 Lake street, Chicago, are directing attention to their reduced prices on hand and foot power machinery.

THE PREPARED ROOFING furnished by M. Ehret, Jr., & Co., of Chicago, Philadelphia and St. Louis, is declared by the makers to be the best, cheapest and most durable now before the public. It is also described as being water, steam, acid and gas proof. The makers invite the trade to send for circulars containing price list, references and full particulars.

EDWIN A. JACKSON & BRO., No. 71 Beekman street, New York, in their card which appears in another part of this issue, ask several pertinent questions concerning the warmth and comfort of rooms in dwellings, and also propose problems concerning the heating of several rooms with a single apparatus. The answer to all these questions is the Jackson ventilating grate, with which many of our readers are already practically familiar. The firm offer a catalogue which gives full particulars concerning this form of heating apparatus.

THE ELLRICH HARDWARE COMPANY, of Plantsville, Conn., are offering the Ellrich ratchet screw-driver, with different sized bits, packed in a neat case and sent by mail. This article is something in which wood-workers very generally will feel an interest.

STABLE FITTINGS are staple articles of supply with many builders who are engaged in fitting up country places or who have contracts for city stables. The J. L. Mott Iron Works, of 88 and 90 Beekman street, New York, and with branch store at 307 Wabash avenue, Chicago, are directing attention to their line of cast and wrought iron, solid brass and bronze stable fittings. They also direct attention to crestings, finials and weather vanes which they manufacture. They have a new catalogue, which is mailed to builders upon application.

WM. T. COMSTOCK, No. 6 Astor place, New York, is publishing a very complete work on details, entitled, "Modern Architectural Practice." No. 1 contains a large country house in detail by Bruce Price, architect. This is shown in 24 plates, 12 x 15 inches in size, and is accompanied by full specification, illustrated by woodcuts and diagrams showing special features of construction. A reduced *fac simile* of one of the plates will be found in the publisher's card in another part of this issue.

THE STANDARD STAINED GLASS WORKS, No. 144 North Ninth street, Philadelphia, direct attention to their facilities for embossed and ornamental work of every description, and modern art stained glass for dwellings, churches and public buildings.

MERRIAN & STOCKWELL, Millbury, Mass., who make specialties of roof crestings and builders' ironwork, invite the trade to send for estimates.

THE AMERICAN CRYSTAL LIGHT COMPANY, No. 7 Kilby street, Boston, Mass., are putting upon the market an incidence window, upon which a patent has recently been granted. The window consists of a series of lights placed in front of and below the area opening of a building, and so adjusted as to receive the rays thrown downward and to reflect them at nearly right angles into the cellar or basement. A circular which they have issued contains a general view of the apparatus and sketches of two cellars, in one of which darkness, and consequently confusion, prevails, while in the other light is obtained by means of their window, and everything is in order. The circular presents a number of advantages and benefits derived from the use of this apparatus, and is of general interest to architects and builders.

A MACHINE has been patented by Edward Tunstead and J. W. Moore, of Minneapolis, Minn., for slitting sheet metal in a way to adapt the same for use for lathing. The shear is of the lever or direct-acting variety, having a single blade above and a double blade at the bottom. The single blade is beveled on both sides, and the lower end of it is made concave, so as to form a pointed edge. This serves to start the metal. In operation the upper blade slits the metal, while its further motion depresses the edge, bending the cut sides into the die at nearly right angles to the surface of the sheet. A slot is thus formed which serves to clinch the plastering.

MR. EDWIN A. JACKSON, of New York, has recently been granted a patent for improvements in the construction of ventilating grates, consisting essentially of an inclosing frame or jacket formed with a double air space for more effectually supplying and saving heat, together with a novel arrangement of deflecting plates or partitions, forcing the air to take an indirect course and at the same time subjecting it to the full action of the fire before passing out through the openings into the space to be heated. In practical use the operation may be described as follows: Pure air from outdoors is admitted through an opening in the rear lower part of the shell or jacket and is distributed uniformly over the entire heating surface of the recesses in the surrounding shell or jacket by means of heated spurs directly back of and on the sides of the fire. From these recesses mentioned the partially-heated air enters the space between the top plates, passing around the walls of the smoke-flues, each of which imparts its heat to the passing current, until it is finally discharged out of the openings in the frieze of the grate or conducted up a pipe to apartments above, which may be regulated by dampers. Intervening plates cause the heated current of air to take an indirect course upward before passing up the heat-conducting flue or pipe.

AT THE FAIR OF THE AMERICAN INSTITUTE, which closed recently, Charles E Little, No. 59 Fulton street, New York, received medals for his exhibit of mechanics' and machinists' tools, brass cabinet hardware, W. F. & J. Barnes Company's power drills and wood and metal working machinery and the Diamond Emery Machine Company's grinding machinery.

IN ANOTHER PORTION of this issue the Builders' and Manufacturers' Mutual Benefit Association of America, of which A. J. Bicknell is secretary, with office at No. 239 Broadway, New York, call attention to their co-operative insurance for builders and those in the allied trades. The significant announcement is made that the average cost of maintaining a $1000 benefit during the past year was less than $7. This also includes the annual dues.

THE YALE & TOWNE MFG. COMPANY, Stamford, Conn., write us that the engravings used in the November number of *Carpentry and Building* illustrating the right and left of door trimmings, &c., originated with their company and first appeared in their books in 1884. Messrs. Charles A. Strellinger & Co., of Detroit, to whom we credited the cuts in our article, inform us that they were borrowed from the company named for use in their catalogue. It gives us pleasure to make correction and to give credit to whom credit is due. The illustrations in question have done much to bring order out of confusion, and they are of the greatest interest to all who have occasion to order door trimmings.

THE WELL-KNOWN FIRM of T. C. Snyder & Co., Canton, Ohio, manufacturers of iron roofing, corrugated iron, &c., have been incorporated, and for the future are to be known as the Canton Iron Roofing Company. The establishment have an enviable reputation, and their goods have been sent into every State in the Union. Catalogues, price lists and samples are offered to the trade upon application.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, of Cincinnati, have their current price list in the form of a four-page letter sheet, the last page of which is ruled and printed in the form of an ordinary letter-head. The other three pages are devoted to the usual matter contained in price lists, such as quotations of goods, rates of freight, terms, &c. On the third page illustrations are presented of special tools which are furnished by the company for putting their materials upon buildings. These include squeezing tongs, edging tongs, plain snips, mallet, jointer, hand seamer and corrugated snips.

SINCE COMPLETING the rebuilding of their stamping works, which were burned some months since, and adding considerable new machinery, Bakewell & Mullins have had time to give attention to other features of their extensive establishment. One of the most important improvements which has been introduced is a private switch, connecting with the P., F. W. and C. Railroad, by which means shipments of iron are discharged almost immediately in front of the machinery that is employed in cutting and working it, and by means of which also shipments of finished work are made with the smallest possible amount of handling.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

EARLY in December last the Master Builders' Association of Boston issued an invitation to various associations of the same character in several of the large cities of the Union to assemble in the city of Boston on January 10, 11 and 12, for the purpose of discussing the feasibility of forming a national association, and to take steps to secure the formation of such an association in the event of the approval of the idea. A large number of the associations responded favorably, and named their representatives. Among the cities sending delegates to this convention may be mentioned the following: Albany, N. Y.; Baltimore, Md.; Chicago, Ill.; Cincinnati, Ohio; Detroit, Mich.; Philadelphia, Pa.; St. Paul, Minn., and Washington, D. C. Representatives from the different organizations in these cities met in Boston at the time appointed, and in conjunction with the representatives from the Boston association discussed the question, and as a result adopted certain resolutions as a basis to secure a convention proper of the various industries interested in the construction and erection of buildings throughout the United States. The conference was of the opinion that it was only competent to arrange a method of bringing about a convention, and took special pains to adopt only such resolutions as properly belonged to a preliminary meeting, leaving decisive action to the convention when it convened. The preamble and resolutions adopted will be found in another part of this issue. The movement is one that must commend itself to every intelligent builder. The building trades have many interests in common which will be well served by a national organization. If it does nothing else, it will add dignity to the building business, and bring it to the favorable attention of the general public.

IN A recent New York paper we come across the following advertisement: "Framer wanted near the city, who can work from plans. Address," &c. That there should be any framer worthy of the name who could not work from plans is surprising, and yet it is a fact that many of them are entirely ignorant of this knowledge so necessary to good and intelligent work. The facilities for enabling men to obtain a knowledge of drawing and the technical sciences are few and open to immense improvement, but there are so many practical manuals of drawing published that any man who has the desire to learn would, with a little perseverance, find it by no means a difficult task. That an advertiser should deem it needful to mention a condition of a knowledge so necessary in framing of any kind is a suggestive fact, and while showing us that the workmen of this trade in common with many others are open to considerable improvement, leads us to hope that the time is not very far distant when a system of technical education will be inaugurated throughout the country with that end.

HOW to extinguish a chimney fire is sometimes a question of no small moment. Chimneys are apt to burn in country houses, away from fire appliances, as well as in the city, where fire apparatus is always at hand A means that was resorted to in Baltimore on an occasion of this kind a short time since may interest some of our readers. It seems that the plan has been employed there to a greater or less extent for some years past. The remedy is nothing more nor less than discharging a pistol into the chimney. In this case five shots were fired in rapid succession. Instantly the soot and fire dropped down, and the fire was thereby extinguished. The theory is that the concussion loosens the accumulated soot. This remedy is so simple and so easily applied that it should be treasured alongside of the old rule of pouring salt down the chimney.

THE PAYMENT of hands in large manufacturing establishments is a matter of considerable importance. More especially is this the case when the office and works are somewhat remote from a bank, making it necessary for the proprietor or a clerk to carry a considerable sum of money a long distance each pay day. Many a robbery has taken place under these conditions, and the danger of some such thing occurring is increased by the fact that the trips with money are made at fixed times and by determined routes. Different expedients have been resorted to by firms to overcome these risks, and to simplify matters. One to which our attention has been recently called seems to work very satisfactorily, and after several years' use is preferred by the men to the old plan of payment. The scheme referred to employs checks. The company maintain a special bank account against which checks are drawn in favor of the workman. The company employs about 1600 men, and payments are made semi-monthly. The checks are drawn in the following form: "Pay to the order of John Smith or bearer." The institution in question is in most excellent credit, and these "pay checks," as they are called, are as readily received by the tradesmen in the town in which they are located as though they were cash. A special form of check is employed by which its nature is indicated. A different size and form of check is used for the ordinary disbursements of money by the company.

THE third annual meeting of the Missouri State Association of Architects convened in St. Louis on the 11th ult. The session was opened by the president of the organization, Mr. J. S. McGrath. In the course of his remarks the president paid particular attention to the features of building construction for preventing the occurrence of fires. The report of the committee on architects' licenses and lien laws stated that in the estimation of the committee the licensing of architects was not expedient at present in the State of Missouri, on account of the lack of necessary legislation. The committee advised the abolishment of certain laws existing in the State of Missouri, with reference to liens, which are deemed detrimental to the general building interest. Mr. Chas. E. Ilsley spoke on the subject of architectural pupilage, and Mr. J. H. McNamara read an interesting and valuable paper on Stone as a Building Material, Its Varieties and Uses. Other interesting papers were presented in the course of the session.

NATURAL GAS continues to be the wonder and pride of Pittsburgh. The citizens of what used to be the Smoky City, and which on account of natural gas is fast losing its distinctive character, never tire of explaining to the visitor the wonderful economies of natural gas. Some of the fixtures which have been made for the utilization of this fuel are remarkable in character and wonderful in the results accomplished. Much progress has been made within a year in this respect, and much of the crudity which existed in the manipulation of this fuel a short time since has disappeared. Natural gas has been assimilated, so to speak, and is at present a part and parcel of the great industrial center commonly known as Pittsburgh. By this we do not mean to indicate that other localities are behind Pittsburgh in the way in which natural gas is being utilized, for undoubtedly other places are fully abreast of Pittsburgh in this respect. This city, however, is the natural center of manufacturing in which the new fuel is employed. The cheapening of the cost of manufacture growing out of the use of natural gas is something surprising.

WHILE in Pittsburgh a short time since we visited an establishment devoted to sheet-metal work, in which results were given us in a form to admit of comparison that will no doubt interest our readers. The steam of a 10-horse-power engine is being generated by gas heat. Some eight stoves for warming the shop are furnished with the same kind of feel. A grate in the office is likewise supplied. Illumination of the entire establishment comes from the same source, and some 20 soldering furnaces also utilize natural gas. The gas for all this work, we are assured, amounts to less than the sum paid for charcoal for the soldering furnaces alone prior to the time that gas was introduced. This result would seem to leave nothing to be desired. Such, however, is not the case, so far as the proprietors of the establishment in question are concerned, for they are veritably groaning under the burdensome exactions of a gigantic monopoly. Their neighbors are paying less for gas than they are, and accordingly something must be done. An opposition company quite recently ran their pipes through the streets on which their shop is located. At once their prospects brightened. Their expectations now are that for next year their gas bills will be cut in two, somewhere near the middle. If we were to intimate that this saving of 50 per cent. will amount to less than $160 we would be indi-

cating what the gas for such an establishment as we have described costs in the city named.

SIR T. SPENCER WELLS, in his inaugural address as president of the Ninth Congress of the Sanitary Institute of Great Britain, made some extraordinary statements concerning the increased length of life consequent upon improved methods of sanitation. "We cannot be far wrong," he says, "if we put the average duration of human life in Great Britian half a century ago at about 30 years; now, according to the healthy life table, it is 49 years." Though it is undoubtedly true that much benefit has resulted to the human race through the adoption of better sanitary methods, it seems hard to believe that any such remarkable decrease in the death rate of a country could follow in so short a time from this cause. We think that these figures may perhaps be explained by the fact that mortality statistics half a century ago were not compiled with the care they are at present, and that consequently the old reports may be in serious error in the statements concerning the annual number of deaths per unit of population. However this may be, we cannot positively disprove the statement, so we may as well accept it thankfully and await the coming years for certain knowledge on the subject. No improvement is more clearly manifest than when its results are expressed in the coin of the realm, and it will therefore prove of considerable interest to follow the deductions made by Sir Spencer Wells from the above premise by the substitution of a monetary value for the life of an individual. The population of Great Britain has increased some 8,000,000 during the past 50 years, and out of that number it may be assumed 2,000,000 is the increase due to sanitary and medical work. Now, figuring on the basis that each individual is worth £150, the total saving may be put down at £300,000,000.

BUT regarding the subject from a less mercenary standpoint and coming down to the beneficial results following specific improvements, we find in a recent number of the *Revue Scientifique* corresponding testimony to the advantages of practical sanitation. As stated in our French contemporary, the substitution of sewers for the system formerly practiced in all Continental countries, of temporarily depositing house wastes in cesspools and vaults, has resulted in a greatly diminished mortality, particularly from typhoid fever and kindred diseases. In Berlin, where the first attempts to improve upon the old system were made in 1875, the annual death rate has been reduced nearly one-fourth, while that from typhoid fever has been reduced one-half. In Brussels, where cesspools were replaced by sewers in 1870, the mortality from typhoid fever fell at once to about one third of its former rate, and is now about one-fourth. In Frankford nearly similar results have been obtained; and in London, where such wastes are disposed of by sewers, as compared with Paris, where most of the house wastes are still received in cesspools, subject to subsequent removal, the ratio of deaths from typhoid fever is 26 per 100,000 of population, and from diphtheria 18, while the ratios in Paris from the same diseases are respectively 70 and 75 per 100,000 of population.

INDUSTRIAL education is a subject that has prominence in the inaugural address of Governor Ames, of Massachusetts. He says: "The promotion of our manufacturing interests and the welfare of working men and women appear to me to require the early establishment of High Schools of the mechanic arts and of industrial design in our cities and larger towns, and the incorporation of manual training among the studies and exercises of grammar schools, in order to give handicraft, familiarity with the use of tools, and a knowledge of mechanical principles to all the youth of the State. It should be borne in mind that when the existing studies and exercises were introduced into the schools of the commonwealth, by far the greater part of our people lived in isolated houses or in small villages, where every boy had occasion to work and to learn the use of tools. At the present time, with more than three-fourths of our population gathered into cities and large towns, with little or no opportunity for useful work in the intervals of study, a generation is growing up in Massachusetts without instruction or training of eye and hand. The decay of the apprentice system has coincided with this change in depriving our youth of the means of acquiring skill in the use of tools and knowledge of mechanical principles, and in driving them more and more into the already overcrowned ranks of those who follow sedentary occupations; while an increasing severity of competition is making it constantly more difficult for the commonwealth to obtain the advanced position which, from the first, it has held among the manufacturing States of the Union."

POWER DISTRIBUTION from central stations will probably be introduced into San Francisco at no very distant date. The project, so far as we can learn, was first brought forward several years ago, the intention at that time having been to form a company to put down pipes for compressed air on about the same general plan as that adopted by the English company at Birmingham. It was found, however, that the number of consumers of the power would have been too small to have warranted the heavy expenditure which an undertaking of this nature would have entailed, and beyond suggesting the advantages to be derived from such a system of power supply nothing, therefore, was done. With the development during the past few years of the manufacturing interests of the city, especially the increase in the number of establishments where small power is needed and small steam or gas engines are maintained to supply it, the subject of central power stations has again come into prominence, and as a result finally a company has been organized to lay down and maintain and operate a system of pipes for conveying steam, hot water or fluids other than gas or electricity. The special fluid to be used has, we believe, not yet been determined upon. Whatever difficulty there was in obtaining a franchise has been overcome, and with a reasonable degree of activity on the part of the new company it ought not to be long before the city of San Francisco will be in position to enjoy the not altogether unalloyed pleasures of power distribution on a large scale. What these will amount to if either high-pressure steam or hot water be conveyed through the mains can easily be conjectured from the experiences of the New York Steam Company.

THE PLATES.

Plates V, VI and VII, in this issue, are devoted to the front elevation, two side elevations, floor plans, and a portion of the details of a house design by C. Bandtlow, No. 673 Broadway, Brooklyn, E. D., N. Y. Other details are published with the letter press. The designer's estimate of the cost of this building is $3900. Plate VIII contains a very attractive bed-room suite, designed by Henry Pringuer. Reference to this is made in another part of the paper.

Building Trades Conference in Boston.

As stated elsewhere, a meeting called by the Master Builders' Association of Boston met in that city January 10 to 12, and adopted the following preamble and resolutions, which explain themselves:

Whereas, We, representatives of various associations of employers, in trades that have to do with the erection and construction of buildings, are assembled in conference to consider proper forms and methods for the organization of a National Association; therefore, be it

1. *Resolved*, That a convention be called in the city of Chicago, Ill., on Tuesday, the 29th day of March next, for the purpose above recited.

2. *Resolved*, That the name of the proposed association should be the National Master Builders' Association of the United States of America.

3. *Resolved*.—That the object of the proposed association should be understood to be the establishment of uniformity and harmony of action, upon general principles, in all matters that directly affect the interests of contractors, manual workmen and all concerned in the erection and construction of buildings throughout the United States.

4. *Resolved*.—That at this first convention the basis of representation shll be as follows—viz: Each of the various cities of the United States having a population of not less than 50,000 inhabitants, shall be entitled to not more than seven delegates, duly appointed by the master builders' exchange or association in each of the said cities, provided that the said exchange or association shall represent a membership of not less than 50 firms. "The term master builders' exchange or association," as here used, for the purposes set forth, shall be taken to mean any association, whatever its particular title, which represents collectively employers in the various trades that have to do with the erection and construction of buildings, provided the said association be duly and properly incorporated. In the absence of such exchange or association in any of the cities aforesaid, then the special building trades, if found legally organized as associations, shall be asked to unite in sending the seven delegates above referred to. In event of the failure in any city to secure the combined action of special trade organizations, then the leading associations representing a special trade, when occupying the position of master builders, may send the delegates referred to.

5. *Resolved*, That a tax of $15 shall be paid by each association gaining representation at the said first convention, in order to defray the expenses of the preliminary conference and such expenses as may be incident to the first convention.

6. *Resolved*, That authority for the calling of the said first convention shall be and hereby is vested in a committee of five (one of whom shall be the chairman of this conference, and the others appointed by him), with full powers. That they be and hereby are authorized to receive the tax above referred to, and to expend such sums as may be necessary to meet expenses. That they be and hereby are directed to prepare a form of constitution suitable for the government of the proposed National Association, to be laid before the said first convention for action.

[A true copy.]

Attest: W. H. SAYWARD,
Chairman of Conference.

L. H. MCCAMMON, E. E. SCRIBNER, } Secretaries.

The committee for first convention, appointed under the above resolutions, will be Mr. Geo. C. Prussing, of Chicago: Mr. J. Milton Blair, of Cincinnati; Mr. John S. Stevens, of Philadelphia; Mr Thos. J. King, of Washington; Mr. W. H. Sayward, of Boston.

The committee has been organized by the choice of Mr. Geo. C. Prussing as president, Mr. J. Milton Blair as vice-president, Mr. W. H. Sayward as secretary and treasurer. Attest: W. H. SAYWARD,
Secretary of committee.

Quick Church Building.

The builder or carpenter is not unfrequently called on to put up at the shortest notice a hall or church for temporary or permanent use. Usually on account of the short time in which to prepare for such work he has to decline orders of this kind and the work is not done. A more general knowledge of what can be done in such cases, and the ease with which buildings suitable for churches, schools, &c., may be quickly erected in a very neat and inexpensive style, will be of great use. Many small congregations might be provided with comfortable churches at much less cost than is possible with the ordinary methods of construction.

On the 7th of last September the First Congregational Church of Passaic, N. J., found that it must cancel the lease of the room in which it worshipped at the end of the month. The next Wednesday evening the matter was brought up at a business meeting of the society, and it was resolved to build. Seven weeks later the church, which we illustrate, was dedicated, complete and ready for occupancy. The building seats 120 persons, is lighted by gas and warmed by a furnace. It is 36 feet long, 22 feet wide, and is 11 feet 9 inches from the bottom of sill to the top of plate.

Quick Church Building.—First Congregational Church, Passaic, New Jersey.

The following is the simple contract that was made, which is really in the form of a letter:

NEW YORK, September 28, 1886.

To the Building Committee, &c.:

We agree to build a church according to our plan, No. 52, on page 20 of our circular, size 22 x 36 feet. Cover outside with our double-siding and wooden roof sections, and ceiled inside with yellow pine, sides and roof, leaving an air space in roof between the inside ceiling and outside roof of about an inch. Price agreed upon between Messrs. ——— and ———, of Building Committee, and Earl Lee, manager American Patent Portable Building Company, of Corona, L. I.

Price at factory	$800
Delivered on lighter	10
Total	$810

We will furnish a competent man to erect, &c., at $2.50 per day, and agree to have building ready to ship by October 6. (Signed, &c.)

Workmen being scarce at Passaic, on account of a large amount of building, it was thought best to accept the company's offer and erect complete. This they did for $115. The freight they estimated at $40, and the erection $75. It was decided to have a cellar high enough to enable a room to be finished off in it at some future time. The mason-work for this including the piers, chimney not shown in engraving and area at side, and steps leading into it with curbing, cost $248.75. The cellar door and windows cost $30. These of course were furnished by the church, and the whole was made ready for the building. According to the design in the catalogue, the church was to have outside blinds. These were dispensed with, and an allowance of $16 was made. A side door was added as a very essential feature, and the side stoop which was made necessary, added $15 to the cost. Around the upper sash of the windows, narrow panes of cathedral glass were inserted to break the effect of the large plain windows. This added $9 to the original price. The painting was done in a rather expensive manner, and the bill amounted to $135.

The furniture inside consists of 120 theater chairs, made by C. B. Demarest & Co. They cost $1.25 each, making $150. Members of the church put the chairs together without charge. One of Frink's 12-light reflectors was suspended from the beams in the open roof, and cost $32. A furnace and its setting, with one register, cost $104. Connecting the church with the main and putting in the meter, $7. Two side lights between the last pair of windows on the sides cost, say, $5. The setting of the gas fixtures, $10.

The church is rectangular in plan, has an open roof finished with a truss. It consists of two rafters and two beams of the same size, starting from their feet, crossing in the center and joining the opposite rafter a little above the center. The inside work is hard-pine finished in hard-oil finish, and is very neat and pleasing. The seats are of the theater pattern, placed so as to leave an aisle down the center. There are five on each side. The bottoms and backs are of crossed veneers, and the bottoms turn up to be out of the way. On the bottoms there are racks for hats. Part of the rows have continuous frames and are screwed to the floor. The others are divided into three sections, two of which have two chairs together while the middle one is single. By reversing this chair a seat is provided for the teacher in Sabbath school, so that he may face his scholars. The double seats may also be turned, so as to face inward when there is a large class. This is found to be very pleasant and satisfactory. The chairs have neat arms next the aisle, but are without divisions or arms between the seats.

There are four windows on each side and one directly behind the pulpit. The latter could with advantage be omitted. It was found necessary after a few Sabbaths to have a thick curtain put up over it in order to entirely cut off the light. In front the doors are now double, but the plan calls for a single one. The single door would have been better, as the space available is limited, and the halves of the double doors are narrower than the single one would have been. The platform of the porch in front of the church door is 6 feet square. This has been converted into a stormhouse by temporary sides, which are hooked on, and a door in front. One of the sides contains a window. This porch is too small. It would be better if it could be made 2 feet larger each way, as there is not sufficient room between the doors for people to stand while taking off their wraps.

The proportions of the building itself are very good in all respects except the width. With five seats on each side, the aisle is not as wide as is desirable when the house is full. If the design could be altered so as to give another foot of width in the aisle, it would enable camp chairs to be used in case of a crowd, and at the same time would give much better egress from the church. The cellar of the church is high enough to give fair-sized windows, and, being 8 feet deep, can be readily finished to give a very neat room by making the furnace face away from the side door, and putting the chimney on the corner opposite the same door. One half of the cellar can be utilized in one room. This, however, cannot be done by any other arrangement of pipes and furnace.

The wood roof appears to be perfectly tight against rain, but snow penetrates, and much dripping follows the heating of the church. A corrugated-iron roof would probably be open to the same objection, and would be hot in summer. The best plan seems to be to cover with tin, and as far as possible prevent the wind from driving the snow up between the outer and inner parts of the roof. It was intended to have the space between the outer and inner walls filled with sawdust, but the tearing down of a bridge prevented easy access to the sawmill, and this was omitted. When sawdust can be easily obtained, the filling will be well worth the extra cost of putting in. A quarter-round molding in the corner between the sides and the floor has been put in, and adds perceptibly to the warmth of the church on cold, windy days. In very cold climates a double floor would probably be very desirable. Though these churches are sometimes placed upon posts and boarded up below, it appears that a brick or stone foundation is needed in all parts of the Northern and perhaps a large portion of the Middle States. Ultimately the inside will probably be painted, and then the kind of wood will be of little importance.

Durability of Raft Timber.—Raft timber that has been floated down rivers has been ascertained to be no longer liable to the attack of dry-rot. So much so is this said to be the case that in Alsace it is customary to specify that only raft timber shall be employed. The water slowly dissolves out the albumen and salts, and thus deprives the fungus of the nutriment needful for its development. A French investigator, we are told, has found by experiment that, whereas fresh sawdust when buried in damp earth rots away in a few years, sawdust which has been soaked for some time in water, and has been thereby deprived of soluble matters, will remain in the ground under similar circumstances wholly unchanged and only slightly tinged on the exterior with earthy matters dissolved from the soil.

In some of the great sawmill establishments of the West 6-foot circular saws are run 760 revolutions to the minute. Running at 750 revolutions to the minute the teeth of the 6-foot saw are travelling nearly 3 miles a minute. Six-foot saws have been driven at as high rate of speed as 800 revolutions to the minute. In Michigan, a few years ago, a Canadian company geared up its mill to run its 6-foot saw 850 revolutions to the minute. A sawmill at Paducah, Ky., which had a 76-inch saw and steam feed, cut one day 10,571 feet of 1-inch poplar boards in about 70 minutes. In this trial the saw made no sawdust; each tooth tore our a strip of wood about ¼ inch long. Michigan sawyers have boasted of a mill dropping 16 1-inch 16-foot boards a minute, but this seems like an exaggeration.

Clapboards vs. Siding.

The indiscriminate use of several terms indicating practically the same thing, and yet each in itself having a specific meaning, frequently leads to confusion. A number of instances of this kind might be cited among the terms occasionally used by builders and architects. An instance in point is clapboard, siding and weather boarding. In certain localities one of these terms will be employed to the exclusion of the others. Again, in other localities one of them are used interchangeably, but each of them having its own peculiar shade of meaning. All of them, as our readers will probably perceive, relate to the outer covering used upon frame buildings, and some of our readers perhaps will be surprised to know that in other sections of the country they are synonymous, and others of our readers will likewise be surprised to know that in other sections of the country they are not received in that way by all. In matters of this kind the dictionaries help very little. The term siding, for example, is defined in one of the leading dictionaries as the attaching of one's self to a party; also as the turnout of a railroad. The latter is defined as peculiarly English, and yet we hear the term employed very frequently in our own country. The idea of siding in the sense used by builders is not referred to at all. Beveled siding, drop siding and other similar terms are in common use, and in certain sections siding seems to be a term that in a measure has superseded the old term weather boarding. The latter still defines overlapping boards of a certain thickness, while siding refers to boards worked in peculiar shapes, and which nail close to the studding or sheeting over which they may be placed. The term clapboarding in certain parts of the country is used in the sense of weather boarding, and yet years ago, as far back as when we were carrying our books to school day by day, we remember many piles of clapboards in the woods through which our way lay, gotten out by the simple process of splitting to approximate size and finishing with a draw-knife. In those days, and in that part of the country, which, by the way, was west of the Mississippi, clapboards were applied to a building vertically, and not in horizontal courses. They were put on in some respects similiarly to the courses of shingles on a roof. Weather boarding in Webster's dictionary is described as boards so laid one over another, as to exclude rain and snow. Clapboards are described as boards, thicker at one edge than at the other, and used for covering the outside of houses.

The question of the proper use of terms is one of interest to all who care for precise language in the trades in which they are engaged. The most we had in mind in writing what we have here presented, was to awaken discussion, and to draw out from our readers letters describing the use of the several terms in their own localities. We hope our readers will act upon this suggestion and favor us with numerous letters.

Attractive Railway Stations.

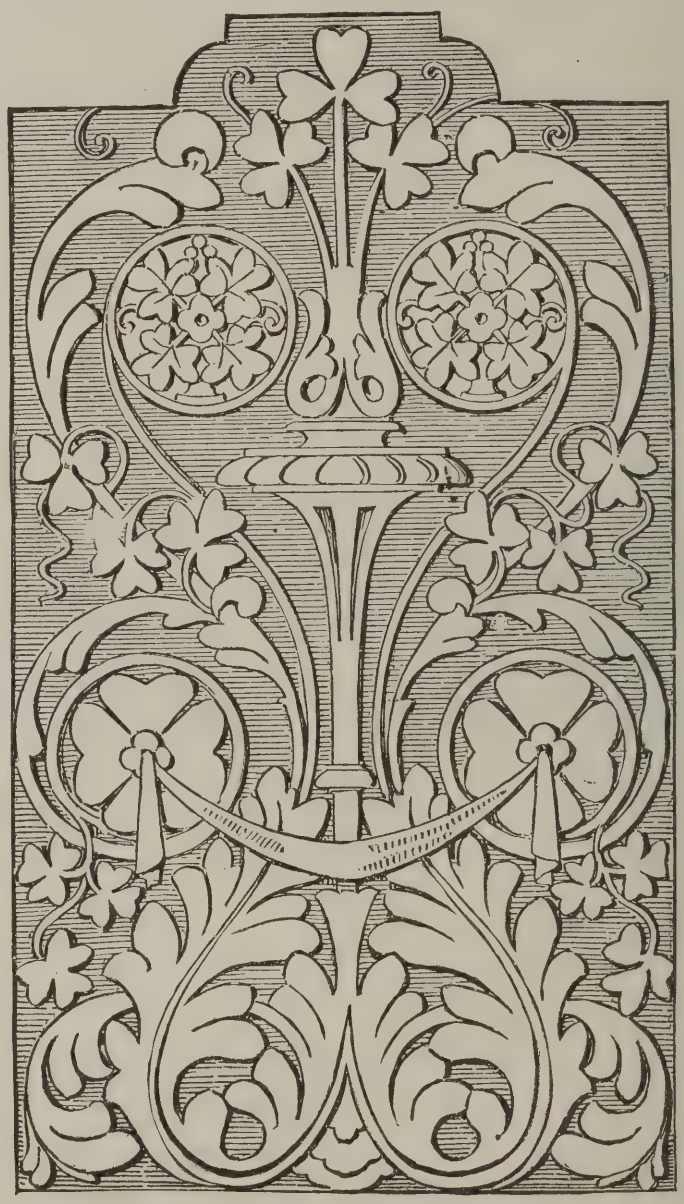
One of our Western exchanges, referring to the change that has come over the architecture of railway stations during the past few years, says:

The public has not appreciated the great progress made by the railroad companies of this country in the matter of stations, the better style of architecture, the more convenient and pleasanter waiting-rooms, and the more cleanly and attractive surroundings at both city and country stations. The railroad station in a suburban town holds a place of importance along with the post office, the town hall and the church. The larger portion of the male inhabitants and quite a number of the females see it at least twice in the course of the day, and the influence which its appearance has in the selection of a dwelling place, although perhaps not recognized, is real and potent. Of course the architectural character of the station must depend upon the character of the neighborhood, and no railroad could be expected to build a palace among sordid or squalid surroundings. On the other hand, it should not require its passengers to purchase their tickets and wait for their trains in buildings which are, many of them, hardly decent, and most of them mere shelters from the actual inclemency of our Northern climate. Every one remembers the square, packing-box form of the original station, generally painted lead color, often without doors and with only remnants of windows—stations whose only furniture was a wooden bench ornamented with the rudely-carved initials of the waiting passengers or the loafers of the neighborhood, and whose plastered walls provided a canvas for amateur caricaturists and lampooners. These have gradually given place to neat and pretty stations of wood or corrugated iron, sometimes in the Queen Anne style, which add much to the appearance of the town or village. In the New England States and in Pennsylvania fine stone buildings are being erected for stations, but in the West this kind of buildings, although sub-tantial and rustic in character, would not be practical. But on Western roads green plats and attractive flower-beds can be made quite inviting with very little trouble. The Pennsylvania lines have set an excellent example in this direction. Until the Pennsylvania people took hold of this matter railroads had been regarded as a scar seaming the face of the nature, as no attempt had been made to soften the grimness of the appearance. Another pleasing feature which is becoming quite apparent is that, where these better class of stations are built and the surroundings beautified, the class of loafers which usually congregate about the depots become more civilized and do not spit tobacco juice all over the ladies' or even the gentlemen's waiting-room floor. Neither do they stare out of countenance a lady who happens to be a stranger in the town and is awaiting at the station the arrival of a train. The whole tendency from the improvements above alluded to is to elevate socially and morally the inhabitants where such improvements are made.

Designs for Carvers.

(Continued from page 5, January number.)

After presenting the natural forms from which designs may be derived useful for wood carvers, the writer from whom we have been quoting introduces several panels showing rather free adaptations of the foregoing. He concludes the article as follows:



Designs for Carvers.—Fig. 12.—Suggestion of Panel Employing Conventionalized Plant Forms.

Having thus collected our materials, the important question arises, What is to be done with them? for commercialism must in these hard times obtrude itself even in such a rural region as the rockery at Kew. The answer to that question brings us to the main, although the briefest, portion of this article, viz., the application of these forms to various designs specially adapted for the furniture of our times. It will be seen that these two plants have supplied nearly all the materials for the two panels placed first and second The conventional leafwork and rosettes of No. 12 are simply adaptations of the natural leaf, and will, by the way, illustrate our remarks as to the natural basis of conventional ornament as well as the liberty

the designer may allow himself in dealing with natural forms. This natural basis is further illustrated, and that very clearly, in the third panel. The conventional leaf-work of this panel is of a character familiar to carvers, but the component parts are easily traced in the *bathcartia villosa*, which will be found among our sketches (Fig. 4). In designing these panels we have had in view not only to illustrate our remarks as to adaptation of natural forms, but also to provide designs which may be of practical use to some of our carvers.

An Attractive Bed-Room Suite.

Those of our readers who are engaged in cabinet work, or who are interested in furniture designs, will be pleased with the inlaid bed-room suite shown in plate VIII, published with this number. The design is by Henry Pringuer, well known to the cabinet making and art furnishing trades of Great Britain. Writing the description of this suite, Mr. Pringuer says:

Designs for Carvers. —Fig. 13.—Detail of Rosette Shown in Fig. 12.

The exclusive use of the straight line is, we know, held by some eminent art authorities to be the acme of artistic excellence and refinement; and we are not second to them in our admiration of plain square work, but many certainly carry the theory too far, and banish altogether Hogarth's "line of beauty." To a certain extent, then, we agree with that school of thought which teaches us to "act on the square," and there is no doubt that such wholesome restrictions have certainly been largely instrumental in the raising of the artistic standard of modern furniture. But people tire of a "hard and fast line," and the curve inevitably comes to the front again in connection with cabinet work. The rigidity and repetition of the straight line is certainly becoming a trifle monotonous, and a little deviation from this order of things would, we think, meet with a favorable reception from the furnishing public. It must not be understood by these remarks that we advocate a return to the serpentine carcase chiffonier or sideboard, or tortuous cabriole suite. These articles only serve to show the abuse, and not the proper use of the curved or shaped line. For a warning in this respect it is only necessary to refer to such furniture as that produced during the reign of Louis XV., and copied in this country to the detriment of our national art. Fortunately, of late years our domestic articles have been rescued from such destructive influences, and a return to a refined and classic line of thought has resulted. The accompanying design is the outcome of such considerations as the foregoing. The introduction of the round corner, and its adaptation, forms one of the principal items in the design, and is, we think, pleasing in effect. Anyhow, it is a change from the ever-recurring square corner, which is so much resorted to now. The action of the dressing table glass is arranged upon the rack principle. The glass behind is supported by a framework which is hinged to the same, and also to the fretwork rail at the back of the table. The angle of the glass is determined by means of the projecting wings of fretwork upon either side, which are designed to answer the purpose of racks, and by which means the lower part of the glass is held in position. Instead of occupying valuable space upon the top of the table, the jewel drawers are arranged at the sides —a position just as convenient as upon the top and more out of the way. The corners of the wardrobe are split up in such a way as to give a cabinet-like appearance to the article, thus rendering it more attractive and none the less useful. As a drawer is an awkward arrangement for a corner, usually offering little accommodation on account of such a position and shape, we have introduced a receptacle for oddments in the form of a box or small cupboard, with a curtained recess below. The latter is intended for the reception of boots, slippers, &c. The center door is divided into panels. Thus the beveled glass plate is reduced to reasonable proportions, and in appearance rendered less obtrusive than ordinarily, and without any detriment to its utility. Both sides of the wardrobe are fitted up with small drawer and cupboard, accommodation of an extensive character affording an opportunity for further classi-

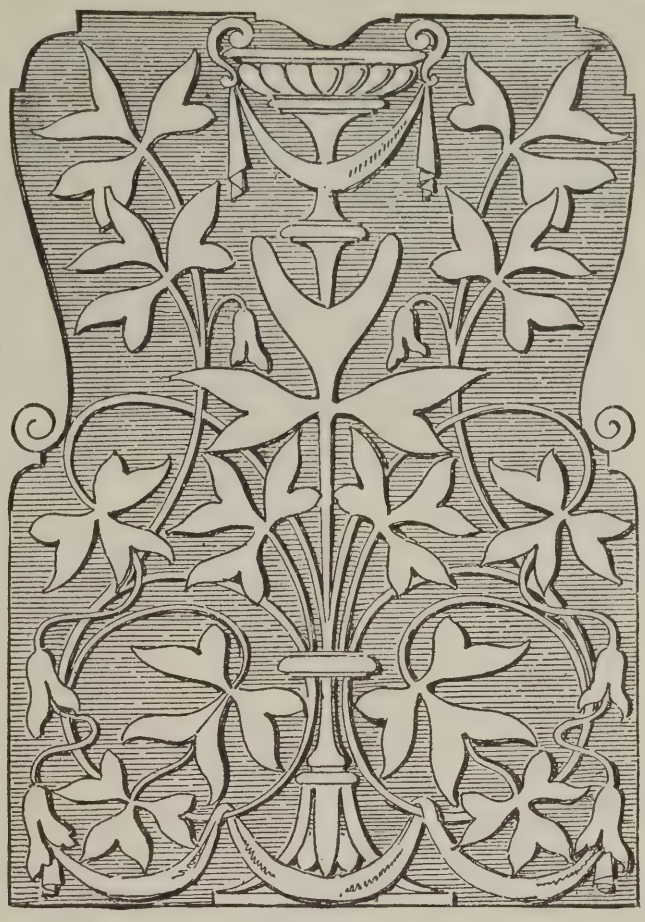


Fig. 15.—Suggestion for a Panel.

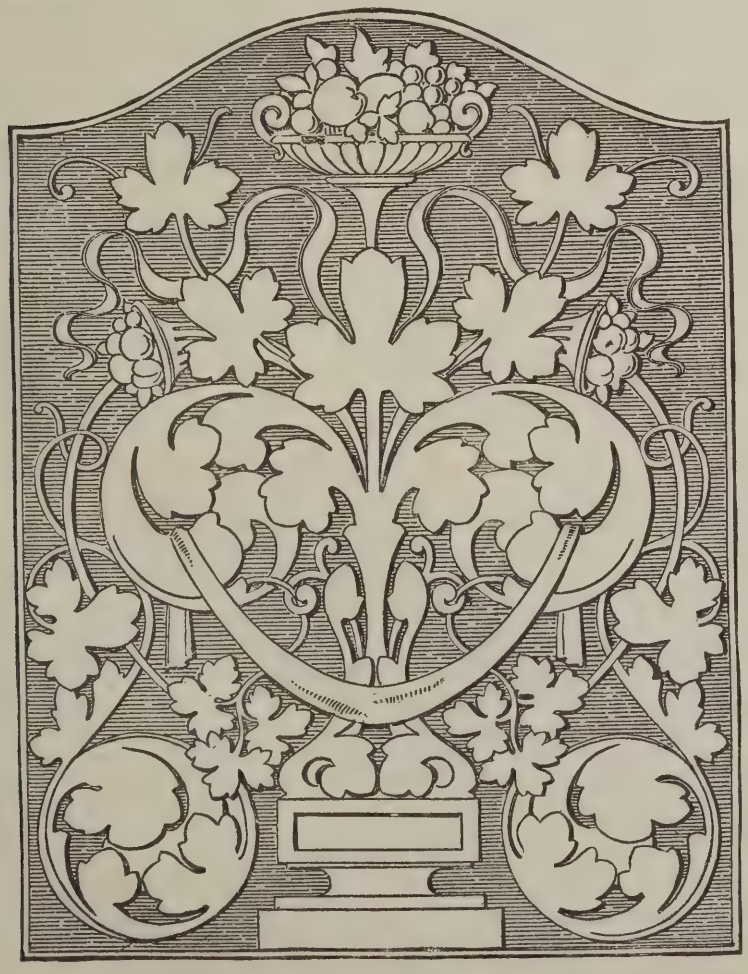


Fig. 14.—Panel Using the Same Elements as in Fig. 12.

fication of the smaller articles of dress. By such an arrangement much annoyance, caused by overcrowding a limited area, would be avoided. The use of the upper part of the article will be evident from the hat box indicated in our illustration. The washstand and chair are sufficiently explicit, and therefore are independent of comment. This suit would make up prettily in rosewood or satinwood inlaid, and not the least important feature about it is that these rounded corners would be very kindly to the ribs in a bedroom of small dimensions.

Instruction in Wood Turning.

In previous issues we have given some account of the course in general wood-working afforded the students of Sibley College, Cornell University, Ithaca, N. Y. We now have the pleasure of laying before our readers some illustrations representing the course in wood turning conducted in the same institution. Referring to the illustrations it will be seen that the student is first taught to turn a cylinder. His next step is the frustum of a cone, or what in common language would be called a tapering piece. His third step reverts to the cylinder, and puts upon it a series of grooves. The fourth step introduces additional tools and affords him practice in alternate beads and hollows about a cylinder. Following this there are various shapes resembling some of the classic races of ancient architecture, also forms which are occasionally used in columns and balustrades. Further on some complicated work is undertaken and both inside and outside turning is accomplished. The shapes presented are varied, and any amateur who desires to perfect himself in wood turning would be well employed if he gives careful attention to all of those shown herewith.

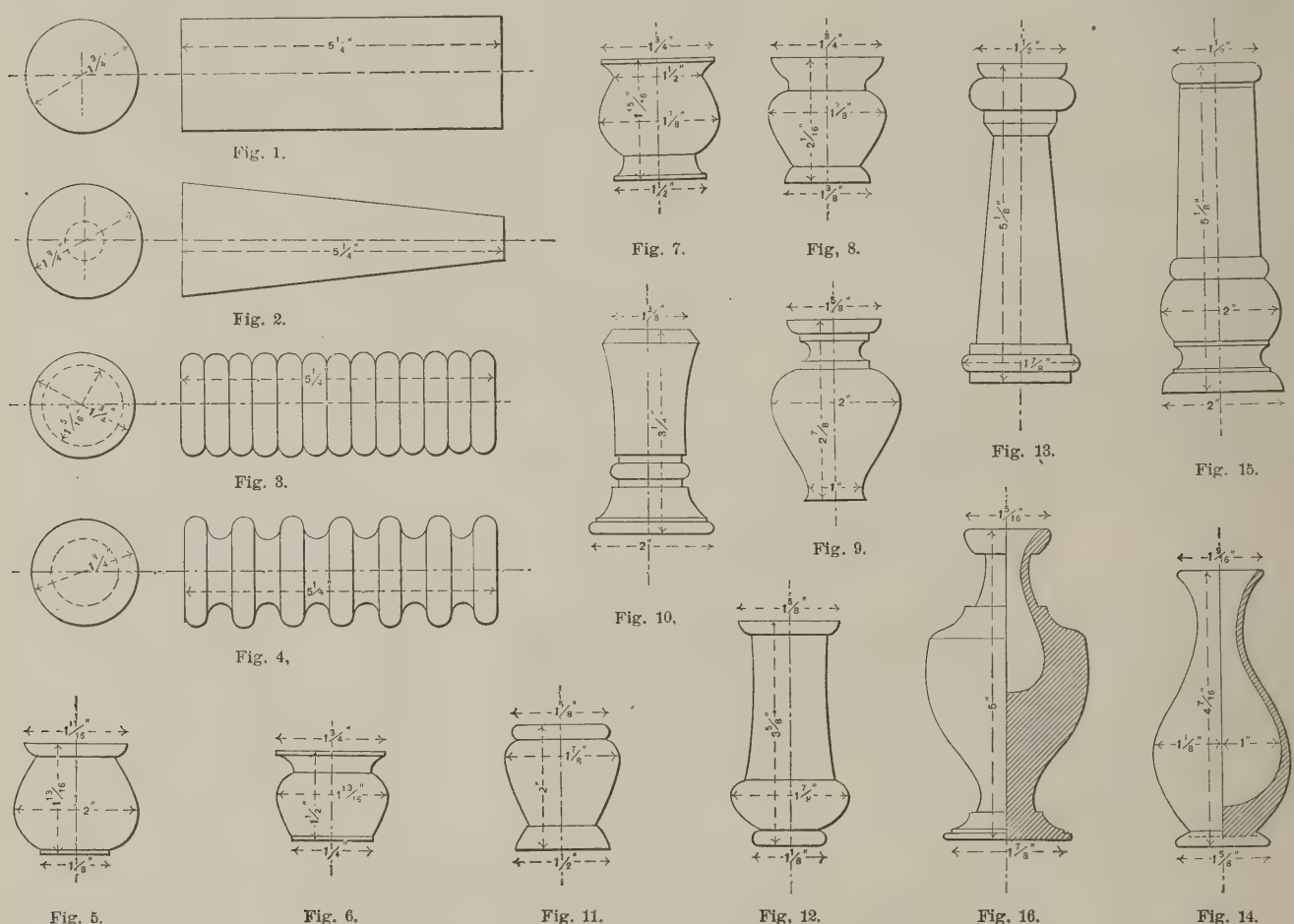


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10. Fig. 11. Fig. 12. Fig. 13. Fig. 15. Fig. 16. Fig. 14.

Exercises Illustrating the Wood-Turning Course in Sibley College.

The number of dwellings erected or commenced in Philadelphia last year was 6636, being an increase of 1000 over the record of the year 1885.

Chimney Construction.

BY C. POWELL KARR, C. E., CONSULTING ARCHITECT.

(Continued from page 3, January issue.)

All courses below the ground level should be laid in hydraulic cement mortar in order to guard against the undermining currents formed by heavy rains, freshets and winter's thaws. Drainage from high ground is very apt to undermine chimney foundations, particularly when such chimneys are situated on low ground whose surface strata are permeable and whose stratum at the chimney foundation is an impermeable clay. All brick used in the footings and other courses below the ground level should be hard, compact and thoroughly burned, but not overburned, because such brick are apt to be weak in unexpected places. Theoretically a brick should be as hard and compact in its interior as on its surfaces, but practically it is not. A brick will crack or split at about one-half its crushing load, and it is this splitting that must be guarded against in building the foundations. Every brick should be laid close, with at least ¼-inch joints, and should be so covered with mortar on its bed, ends and sides that a brick can be placed in position at one operation, and firmly settled to its proper level by a slight tap of the trowel. In no case should mortar be slushed in afterward. Every course should be tested with the spirit level and the vertical faces and edges with a plumb line, in order that no deviation from the perpendicular may ensue by a shifting of the weight of the chimney to one side or the other. Where voids occur they are to be filled with spawls or pieces of brick large enough to be used without wedging, so that no dependence may be placed upon the mortar itself for solidity.

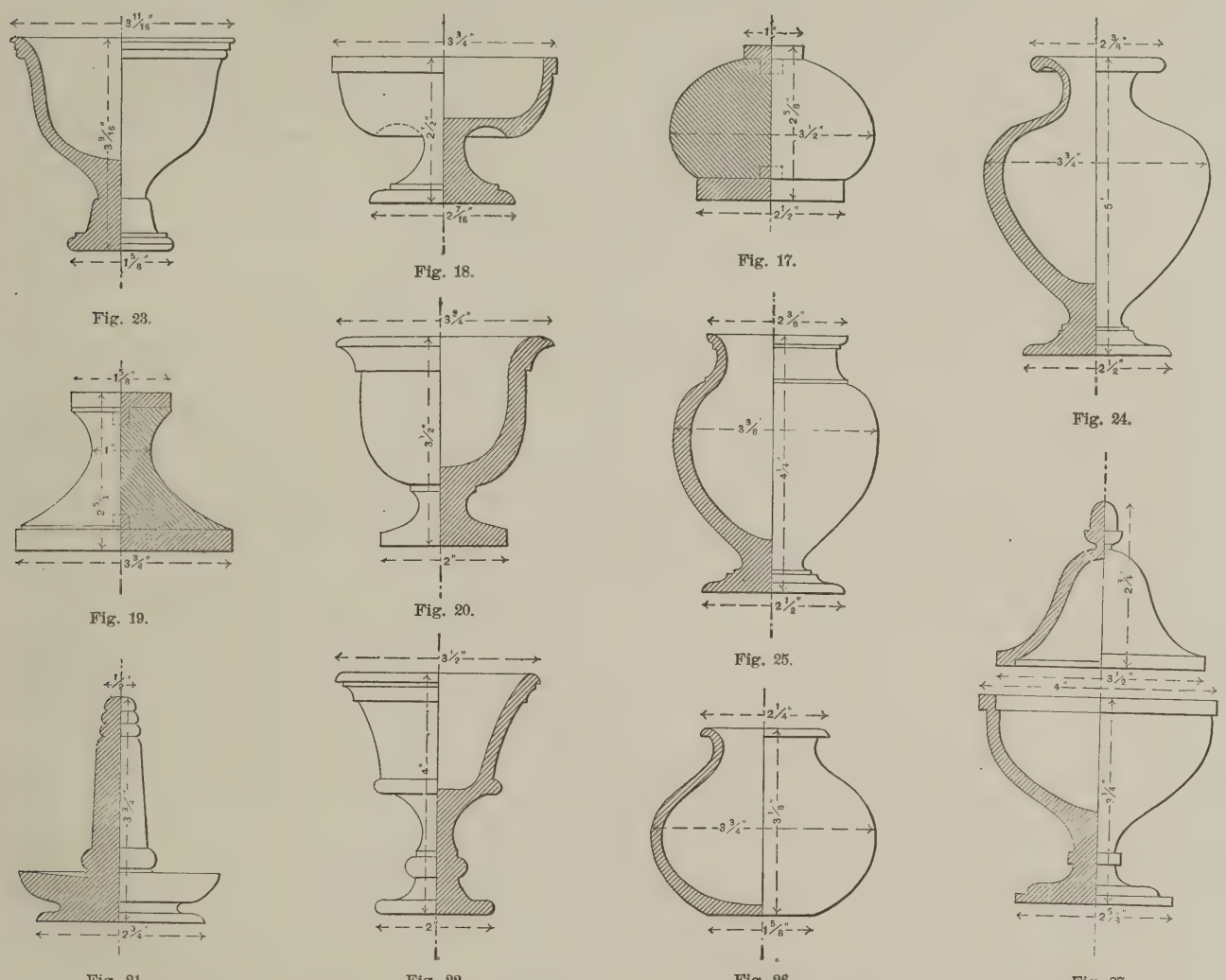
An impression prevails in the minds of some builders that a chimney foundation is a good place to get rid of bats, culls, spawls or other refuse brick, but no impression could be more unwise or injurious to them. A bad foundation is a builder's worst enemy, and for his own future welfare he should insist upon carefully selecting the stock that goes under ground. All masonry is sure to settle and all precautions that can should be taken to insure a uniformity in this settling. A building may be finished, but not completed, for of no building can be it said it is completed when carelessness or ignorance has been displayed in laying its foundations. As soon as the courses below ground are laid and the last course allowed at least 12 hours to set, it would be well to fill up the trench or excavation, either with gravel of a uniform size, if it can be obtained, or soft coal cinders or broken stone. Where it is possible the writer would urge strongly upon the builder to put in his foundations in the fall of the year, any time before the coming of the first frost, and permit the foundation to settle and adjust itself to its surroundings until the ensuing spring; the work will be so much more satisfactory that in a very high chimney, say, one exceeding 200 feet, it should be made a rule. A good foundation is the corner stone of good building. An arch is made at the base of the chimney for the entrance of the smoke-flue, and in order to balance this weakening of the wall a similar opening is made on the opposite side. It also serves to admit workmen to make necessary repairs or clean the main flue. The arches to these entrances should be built of wedge-shaped bricks, molded or rubbed, so as to fit the radius of the soffit. This method will enable the mason to make a thorough bond as in a wall. The brick *voussoirs* of the arch are in two concentric rings, and should be laid to a line on the centers, with a close joint of cement mortar; or, in case of the fire-flues, in fire mortar. If the radius of the segmental arch is made equal to the width of the opening the effect will be pleasing, and the thrust of the arch will be well taken by the chimney walls. The designing and erection of scaffolds for large work have become a special business, and we can only mention a few of the methods in vogue. Where time is not an object to be considered and the chimney stands alone, an exterior scaffold may be

dispensed with. The workman rests upon temporary supports upon the interior of the chimney, and bricks and mortar are supplied to him by means of a rope and pulleys attached so a beam of wood or crane that rises with the chimney. One man and a helper can in this way build a chimney as fast as is consistent with good workmanship and durability for all chimneys below 80 feet in hight. If an exterior scaffold or staging is used it should be built independent of any support from the chimney itself. Sometimes the scaffolding is used as a means of support to the chimney during erection, but this is wrong in principle, for it prevents the proper adjustment of the chimney's load. In building an iron chimney sometimes a device is resorted to known as a "flying scaffold." It consists of cross-arms or bearers resting on angle irons, riveted to the inside of the wrought-iron plates as erected. These bearers carry an internal platform and an iron tube, with cross-head timbers would act as fulcrums to the beam as levers, and thus cause seams or cracks in the walls. The holes made in the masonry to support the staging should be immediately filled up with bricks and mortar after the removal of the frame to the next higher level. It may happen in constructing the foundations that a difficulty will occur in obtaining water-lime. Pure lime may be made hydraulic by the addition of iron hammer scales, such as may be obtained from bloomeries, puddling mills or forge shops. The proportions are given by Mr. Bancroft as: Lime, 2; scale, 1; sand, 5; total, eight parts of measure. Good sound building brick, free from cracks, flaws, stones or lumps of any kind should be used throughout, and they should be burnt so thoroughly that upon breakage a partial vitrification will appear throughout. This may be tested by a knife, which will hardly make an impression unless the brick has been under-burnt. When two thoroughly burnt brick are struck together a clear, ringing sound will be emitted—a dull sound would indicate a soft or shaky brick. It is only by using good brick and mortar that uniformity in the construction can be secured.

As a precautionary measure to insure good bonding, hoop-iron bands from 1 to 1½ inches in width and from $\frac{1}{16}$ to $\frac{1}{20}$ inch in thickness are laid in the bed joints at intervals of from 3 to 4 feet in hight. These bands should be most carefully protected from rusting by being dipped in boiling tar and well sanded to take a better hold upon the mortar, and should be laid in cement mortar. If dampness penetrates the tar covering, oxidation will set in and the rust forming cause an expansion which will open up the joints of the brickwork; and care should be taken to bed the hoop iron in the common brickwork and not in the fire-brick. The length of hoop iron in each bed joint in which it is laid is twice the circumference of the chimney at that joint.

In rectangular chimneys flat iron bars from $\frac{1}{16}$ to ⅛ inch in thickness, and from ¾ to 1 inch wide are used to good advantage, tarred and sanded in the same manner, and at both ends folded over at right angles, so as to embrace from two to three courses. They are laid in the bed joint transversely to the brick, and with the hook ends downward.

Many chimneys consist of two shells or cones, an inner and an outer shell. The outer shell, having an exterior batter of 0.015 to 0.025 per foot of hight, while the thickness at the top is from 4 to 9 inches and the bottom from 16 inches to 2 feet. Between the inner and outer shells is an air space varying from ½ inch to 3 inches, and this space in many large chimneys is used for ventilating purposes. The interior face of the outer shell follows generally the outline of the outer face without, however, any precise degree of exactitude. The outer face of the interior shell may be plumb or conform to the general slope of the outermost faces. The interior faces of the inner shell are arranged in a series of divisions, one above another, the thickness being uniform in each division, but diminishing upward from division to division. The thickness of the brickwork at the top either of the inner or outer shell may be one brick length from top to 20 or 25 feet below, and wherever this point comes let it be the limiting line of the division, the next division being one and a half bricks length in thickness from 20 to 50 from the beginning of this new division, measuring always from the top downward, and then for each new division increase the thickness by half a brick length for each 20 or 25 feet. If, however, the inside diameter at the top exceeds 4½ feet the top length should be one and one half brick lengths in thickness. Whatever hight it may be decided to make one division it would be best to make them all uniform. The inner cone or shell when built of fire-



Exercises Illustrating the Wood-Turning Course in Sibley College.

brick of regular dimensions should be built up distinct and separate from its adjoining shell by from ½ inch to 1 inch air space. In a large chimney this would make two air spaces and three shells, but in some instances the fire-brick section is built to the top and forms the inner shell itself. In all cases the inner shell should be built clear to the top. Again, a superior kind of hard-burned brick capable of withstanding without burning a heat of 1200° F. can now be had of a size uniform with common brick at a price of about $13 per 1000 at New York, and they can be bonded in and built up with the inner shell through as many divisions as may be required and at a great saving in cost over the regular fire-brick. They should be laid in fire-clay, however, not in lime-mortar. But in chimneys designed for egress of hot air from reverberatory, puddling and other high temperature furnaces it will be necessary to use the regulation fire-brick. Sometimes openings, slanting upward from the outside, are made in the outer shell near the top, so that currents of air passing through and upward will impinge upon the topmost rim of the inner shell and form an induced current, thus aiding the natural draft. It will also aid in counterbalancing those downward swirls of the wind that drive the smoke down the chimney. Suppose we have a chimney 100 feet high and its draft power is equal to a head of 73 inches of water, now this is equal to a wind having a velocity of nearly 47 feet per second, which is a very fair breeze, and if this were blowing in a direction opposed to the direction of the horizontal flues it would nulify the draft, and this brings us to a question of dampers. The area of a damper depends upon the hight of the chimney, and where there is only one boiler it may have the same area as the chimney if that is properly proportioned to the power of the boiler. Mr. Box gives the rule that the area of the damper in square inches per horse-power is equal to 110 divided by the square root of the hight of the chimney in feet. The form of the damper is determined by the cross section of the flue. Thus, for a chimney 65 feet high above the fire-grate, the damper should be equal to 13.64 square inches per horse-power, and for a 70 horse boiler we would have a damper of about 20 x 47 inches or 30 x 31 inches.

In most large factories there is only one chimney for all the furnaces. The advantages are a saving in the cost of construction, a uniformity of draft which is difficult to obtain where only one furnace discharges its gaseous products into the chimney, and, lastly, greater efficiency in the work of the furnaces and boilers. Where a furnace has a special chimney the draft is variable. This in degree is small at first, but increases as the ratio of combustion. Where doors are opened to stoke the fire the draft is considerably interfered with, but where several furnaces are connected with a common chimney the draft will increase up to a certain limit with the number of fires that are in communication with the chimney. The pressure of the wind upon a cylindrical chimney is but one-half of what it is upon a square chimney of the same diametral section, that of a hexagonal shaft about three-quarters of the square, and of the octagonal about seven-tenths. Factory chimneys should stand alone, not only on their own foundations, but the walls should not be connected with the walls of any other building unless it may be that of a small boiler house. A chimney should not be connected by masonry of any description with the walls or foundations of the factory to which it belongs. Its own weight upon its bed footings is so much greater per square foot than the weight of the adjoining buildings upon their foundations that if connection is made its settling will either produce cracks in the factory walls or its own walls will yield to the unequal pressure.

Chimneys are generally terminated by a projection or series of projections called a chapter, and while not essential to the work of the chimney it satisfies the eye by its architectural effect. They should be built of light material, such as porous brick or terra cotta, and are generally surmounted by an iron plate or stone coping, to prevent the injurious effects of water soakage in the vertical joints, thus protecting them from wind, rain and frost The horizontal external joints should be what is technically known as "mason's joints." The chapter of very high chimneys should be built with cement mortar, because of its superiority over common mortar to resist the action of the elements. A most excellent cement in which to lay a stone coping for the chapter, or the last two or three courses of brick, can be made of two parts of blacksmith's ashes to three parts of clay to one of sand mixed with linseed oil. It will be found impervious to rain, wind or frost.

According to Professor Rankine a fire-brick lining can be bonded with common brickwork in the ordinary way, provided the fire-bricks are laid in fire-clay mortar and the ordinary bricks in common mortar. His reasons for preferring this mode of construction to an internal fire-brick shell are: 1. When the fire bricks are bonded with the ordinary bricks they contribute together to the stability of the chimney, and so save an additional thickness of ordinary brickwork. 2. Unless the internal chimney is carried up to the top of the outer cone there is a risk of damage through the explosion of gaseous mixtures in the space between. 3. There is also a risk of the cracking of the outer cone at and near the upper end of the inner cone, through unequal heating at that place, unless the inner shaft is carried to the top of the outer one. In some of the largest chimneys, even with the most thoughtful and skillful precautions, it has been found that after a short time a chimney, through unequal settling or some unforeseen special cause, has settled more on one side or deviated from its perpendicularity, and a necessity arises of straightening it, which is done as follows: On the side opposite the direction in which the chimney leans the operation of cutting out courses of brick in several different places is begun near the base of the chimney; these are cut out rather more than half way across, depending, however, largely upon the amount of the deviation. The courses removed are replaced by others diminishing very slightly in thickness from the direction in which the chimney leans, so that the courses removed and replaced by others are sufficient to bring the axis of symmetry back to its true vertical position. In removing the brick the top and bottom joints are thoroughly cleaned off. Good hard brick, closely packed, replace the removed ones, and at the outer ends good oak wedges are inserted. Similar cuts are made right and left of the first cut and similarly treated. The wedges are gradually withdrawn after all the cuts are made, and if the work has been skillfully done the chimney will quietly settle back to its true position. The writer begs to acknowledge his indebtness to the following authorities whom he has consulted in collating and preparing the material for this article: Professor Rankine's works, Thomas Box and Professor Trowbridge on Heat, R. M. and F. J. Bancroft, the Proceedings of the British Institute of Civil Engineers, D. K. Clark, Weisbach's Mechanics of Engineering, Schwackhöfer on Fuel, Peclet and Morin on Heat, Seddon and Dobson on Building, Trautwine, Haswell, Kidder and Molesworth handbooks of tables and engineering data, and the best current practice.

A term very frequently encountered nowadays in speaking of lights is that of candle-power. As a unit of measurement it is to the ordinary mind somewhat indefinite. The *American Grocer*, in speaking upon this subject, presents an explanation which is of interest to those who have met the term, since it is presented in a popular form. It is not all that can be desired, however, from the fact that the term "standard candle" which is used is not altogether definite. It might also be criticised in other features, but we present it without further remarks. It is in the following language: "The measuring of the candle-power of a light is accomplished by comparing the shadow cast by a rod in the light of a standard candle with the shadow cast by the light to be tested. By moving the latter toward or away from the rod a point will be reached at which the shadow cast by both lights will be of the same intensity. The intensity of the two lights is directly proportional to the squares of their distances from the shadows —*i. e.*, suppose the light to be tested is three times the distance of the candle, its illuminating power is nine times as great."

Wood Carving in Japan.

In an address before the Society of Arts, a short time since, Mr. E. Hart presented some very interesting particulars relating to wood carving in Japan. In the course of his remarks he said:

The wood and ivory carvings best known in Europe are netsukes. Netsukes are small objects used as buttons or toggles for attaching to the sash or girdle the medicine-box, or, at a later period, a pipe-case or purse. The earliest known examples are said to date not further back than the sixteenth century, although others of earlier date are reported to be in existence. According to Mr. Anderson, the first professional carver of netsukes is said to have been a native of Kioto, named Rifuho or Hinaya, who worked during the greater part of the seventeenth century, and died in 1670 at the age of 69. The most celebrated worker was Yoshimura Shiuzen, who lived in the early part of the last century, and is the inventor of many designs, which are repeated in close imitation even in the present. Those of his productions which are copied in the "Soken Kisho" will be recognized by all collectors, although the originals are no longer in existence. From this time the number of workmen multiplied, but with a few exceptions they were outside the recognized art circle, and the only records of their names will be found upon their works. It is only within the last 20 or 30 years that foreign demand and foreign liberality of payment have brought the carver of netsukes an adequate reward for his talent; but, unfortunately, the specimens do not gain in originality or power in proportion to their increase in size and elaborateness. The market is flooded with crude rubbish, vile forgeries, and elaborate and unmeaning groups of extreme complication, but little artistic beauty.

The netsuke carver, as Mr. Anderson has well pointed out, included in his range of subjects the whole world of visible phenomena, the personification of proverbial saws, the historic myths, and the favorite mythological legends of Japan. A collection of old netsukes with their stories told and their meaning deciphered is a history in ivory of the daily life, the historic incidents and the legendery beliefs of Japan. Almost every netsuke has its own story to tell, either of religious iconography, of popular myth or of domestic custom. Sometimes the netsuke is simply a reproduction of natural objects—flowers, plants, animals or fish —but penetrated with a sense of natural beauty and enlivened with a gay humor which is eminently and almost unfailingly characteristic of the Japanese and of their naturalistic art. Each flower and tree, too, has its meaning. The pine tree is emblematic of old age; the chrysanthemum, the chosen emblem of the Mikado—the national crest; the *paullownia*, or Awoi of the Shogun; the plum blossom is associated with the nightingale; it is the poet's favorite tree; the cherry blossom is their ideal of beauty, and with it is coupled the pheasant among birds, as is the willow tree with the martin. Sometimes the netsuke shows a deity clothed with all its attributes. The jovial, pot-bellied Hotei, the god of happiness, with his lucky-bag, his fans and groups of children; or the thunder-god with his string of drums; or Daikoku, god of riches, with his rice-bags, which fill with rice at every stroke of the hammer which he carries, and his attendant rat, the privileged Lazarus of his crumbs of rice. Sometimes the figure is that of a well-known warrior, the Japanese Samson, Benkei, carrying off the convent bell of Miidera, which never ceased to wail "I want to go back" till he restored it; of a hero, Yoshitsune, the Bayard of Japan, whose adventures are a never-failing art motive; of a fabulous animal, the dragon, emblem of empire, or the kylin, emblem of halycon days of prosperity, a Buddhist animal whose

tread was harmless to the minutest insect; or symbolic birds—manderin ducks which pine for their mates, and languish when their partner dies, the emblem of conjugal felicity, or one of the many emblems of filial piety—the boy before the cascade which turned to wine to cherish his aged parent, or pulling the miraculous bamboo shoots which rewarded his persevering winter search, or sacrificing himself to the tiger, all belonging to the mixed region of religious fable, poetic fancy or popular superstition. Nothing has been more quickly and readily appreciated in Europe than the remarkable power which the carver in ivory and wood possesses of showing in objects so small a power of telling a story—either of humor or of fancy or of terror—such as in European art is rarely if ever lavished on subjects so minute, but more commonly reserved for larger and more showy and effective work.

Okimonos are larger carved works, a sort of exaggerated and magnified netsuke, which have been, for the most part, made for the European market. They are brought over in great numbers. They are exclusively modern productions. They show remarkable dexterity, skill and patience in the finest examples, but the majority of them are destitute of real artistic feeling, and are little more than showy and clumsy caricatures of the earlier works of Japanese artists, which were executed for patrons who had a definite sense of the meaning of the work, and who would not tolerate clumsy, inferior or superficial qualities of design or execution.

Minton Tiles.

As many of our readers may be interested in the origin of Minton tiles, we present the following account of what led to this result, given by Canon Rock, D. D.:

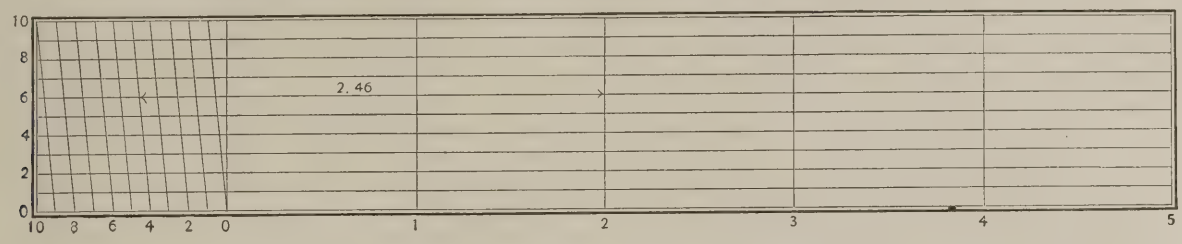
"When living in the Moorlands of Staffordshire, near the Potteries, it was my good fortune to become acquainted with that amiable and able man, the late Herbert Minton, and whenever anything brought him to Alton Towers, or I happened to go to Stoke-upon-Trent, our conversation, sooner or later, always got upon the subject uppermost in his thoughts—the potter's ancient, time honored art. His ambition then was to keep a place upon one of the topmost branches of the commercial tree by manufacturing the finer sorts of hardware and porcelain, richly gilt and beautifully painted tea and dinner services in china, and other articles of household requirement. His first flight, in soaring after a higher kind, was the production of dressing table candlesticks wreathed with garlands, and plates with fruits and flowers in raised work for the ornament of a lady's boudoir. Probably the very first of the latter which was made by him he sent over to me to look at, and the then Countess of Shrewsbury bought it, and at the sale in 1857 at Alton Towers it was sold under the catalogue number of 1228. During one of those delightful chats I had with Minton I urged upon him, specifying the various purposes to which they might be decoratively applied, the imitating of those colored glazed mediæval tiles once so generally used in flooring the chancels of our English churches. 'But where can one find them?' asked my friend. 'In many places,' I answered; 'for instance, in Great Malvern Parish church. Many such are described and figured in the "Archæologia" and other antiquarian books.' 'Though, perhaps, quite well enough for your studies that will hardly do for my purpose,' said Minton. 'I want not merely to see, but to handle—to turn over, to look at on both sides, to closely examine, specimens of unknown pottery and china; to find out, as much as may be, the way in which they were wrought and ornamented. So, too, do my workmen. But I will bear your suggestion in mind, and we will talk of it another time.' We did, and he told me it would not pay. A few years afterward he tried, and the venture not only paid, but paid splendidly."

The Diagonal Scale.

BY ARTUS.

As given in our engraving the diagonal scale is familiar enough to most of our readers. It will be found marked upon the ivory or boxwood rule supplied with most cases of drawing instruments. The use of the scale does not seem to be as generally understood as the convenience of it would warrant, and neither is an explanation found in many of the text-books.

Primarily the use of the diagonal scale is to indicate minute measurements. From the scale it is not at all impossible to measure the 500th part of an inch, or, indeed, a smaller space, although in the form ordinarily found upon rules and protractors $\frac{1}{400}$ inch is the smallest division that can be taken. In actual practice these minute divisions may not be considered to be required, but in map and plan drawing of the finer kind where a small scale is needed and extreme accuracy necessary the success of the operation will depend to a large extent upon the precision with which these small measurements are taken, and the diagonal scale is better adapted than any other system for insuring such precision. In ordinary scale drawing and in taking off measurements of the decimal parts of an inch it is also very convenient.



Diagonal Scale, Illustrating Article by Artus.—Fig. 1.—Fac-simile of Scale.

To illustrate the construction of the scale and the manner in which it is used, let us suppose that the short distance from A to B in Fig. 2 is to form part of a scale, and is to represent 10 feet. It is clear that the distance is too small to allow of our dividing it up into 10 parts to represent single feet. We have, therefore, to adopt some other system. From A and B respectively, we set up the perpendiculars A C and B D, divide them into ten equal parts and from each point we draw lines parallel to A B. We now draw a diagonal line from B to C, when we practically have the distance A B divided up into ten parts as required, and as we shall now see.

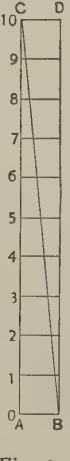


Fig 2.—Construction of Scale.

The figures on the left hand of the line denote the fractional parts of the line A B. Refer to the figure 5, and measure the distance the diagonal line is from the upright B D, and it will be found that it is exactly one-half the whole distance, or as indicated by the figure, $\frac{5}{10}$. The distances on the other horizontal lines will correspond with the figures in each case. For instance, the distance from the diagonal line to the line B D at the figure 1, is one-tenth of the distance A B, and so on. If the line A B were, say, ¼ inch long, and by these means divided up into 10 parts, we should have $\frac{1}{40}$ inch.

It will be understood that the measurements are always to be taken along the horizontal lines and measured from the perpendicular to the diagonal. It will also be understood that the same principle could be applied to any length of base line A B. For example, if we make A B $\frac{1}{10}$ inch long and divide the perpendicular line into 10 parts we shall then have 100 parts of an inch. But the perpendicular line might easily be set up to a greater hight than that shown in the figure and be divided up into a greater number of parts. For instance, if we keep the distance A B still $\frac{1}{10}$ inch and divide the perpendicular (making it sufficiently long to render it easy) into 20 parts we shall then have the 10th part of an inch divided into 20, and so shall be enabled to take distances varying in the 200th part of an inch; if the perpendicular be divided into 40 the $\frac{1}{400}$ inch, and so on.

A very little consideration will make it clear that as there is practically no limit to the hight of the perpendicular and hence the number of parts into which it may be divided, there is, therefore, no limit to the fraction of an inch which may by these means be measured. Applying this principle now to scales as ordinarily constructed and found upon rules we have the form as given in Fig. 1. From this scale we can take inches, tenths and hundredths in one measurement. For instance, if it is wished to take the length 2.46″ we shall put one leg of the compass at 2 in the inches, and the other leg at 4 in the tenths We shall then raise the whole compass to the horizontal line with 6 at the side, when we have the distance required and as marked upon the scale in Fig. 1 for the sake of clearness.

From what has been said it will be apparent that any variety of division may be obtained, and the advantage in the case of setting of to a very small scale can be appreciated. It may be useful to add that diagonal scales, usually marked upon rules, are of three kinds—viz., those giving inches with their tenths and hundredths, those giving half inches with the same subdivisions indicating $\frac{1}{20}$ and $\frac{1}{200}$ inch, and those giving ¼ inch divisions, indicating in the same manner $\frac{1}{40}$ and $\frac{1}{400}$ inch. The first of these is the most useful.

Timber for External Work.

In speaking of timber for external work, T. W. Silloway writes as follows: "When a piece of framing is to be permanently exposed to the weather, it should be treated with one of the preservative solutions, and then thoroughly painted and sanded. Wood in a proper condition when felled, afterward thoroughly seasoned, well saturated with diluted corrosive sublimate, and finally kept properly painted and sanded, is as durable as it ever can be. One caution it would be well to remember, namely, to refrain from applying paint or any preparation to wood before before it is thoroughly seasoned; for should the outside be coated so as effectually to prevent impenetration from without, evaporation will also be prevented from within; therefore, all moisture that may be in the wood will be retained, and rot the piece. Another suggestion is to use timbers as small as the nature of the work will permit. It is a mistake to suppose that large timbers will continue good longer than small ones. The light spokes of a wheel will remain sound and strong for years after the tongue of the cart to which they belonged has entirely decayed. If a timber is sufficiently strong when first used (the requisite allowance being made for

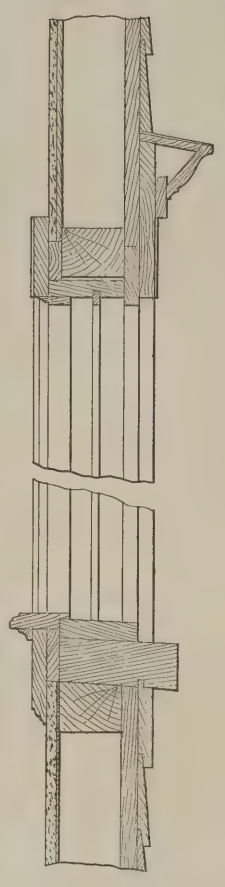
permanent strain), all has been done that prudence would dictate, since no increase of the dimensions of the piece will insure its longer duration. And, finally, it should be scrupulously remembered that timber will not certainly remain sound because a large portion, or even most of it, is in proper condition and well cared for. Only so much as is actually protected will retain its qualities, and any part so exposed as to injure the whole stick will as surely injure or destroy the unprotected part. Therefore the ends of timbers which are built into walls, also all surfaces in contact—as where the side or edge of one stick rests upon another, tenons, in mortises, &c.—should be supplied with air, kept dry, and in every way properly protected."

Outside House Painting.

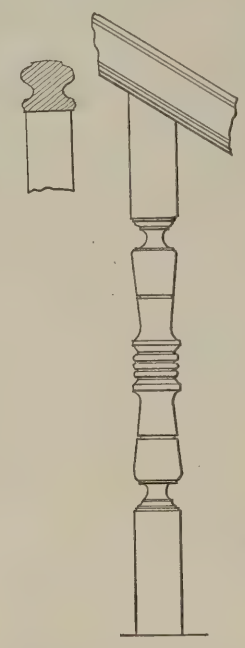
In a recent issue of the *Painter's Magazine* we find the following remarks concerning painting with reference to different buildings in New York and the treatment of some of their details:

Streets of private residences are, on the whole, too uniformly dull not to render welcome the occasional breaking up their spiritless and unenlivening aspect with warm and subdued color where the house is of brick. There is no necessity for the selection of a light or dark red as corresponding to the hues of brick, there being quite a number of tertiary hues of a compound character that are appropriate. A stately brick dwelling at a Fifth avenue corner which has recently been painted a rich olive brown varnished presents quite a pleasing appearance with the pinkish white tint of the stone facings and the laurel green color of lower ornamental basement, windows and iron railway. A brick frontage of miscellaneous hues can always be improved in appearance by a judicious application of the brush. Slate and lavender colors often prove appropriate. Undoubtedly the painting of a single brick house in a row with others that are left plain gives it a distinctive individual appearance which we consider most desirable in cases where the structure had before a dull, heavy, not to say shabby, appearance. The transformation which a house front that has been subjected to the painter's brush undergoes is often astonishing, the job including the touching up of wood and ironwork of suitably contrasting colors. The improved appearance thus secured is apt to tempt conscienceless landlords to feel that they are justified in raising the rent, but the painting trade has benefited by this appreciation of their interests. New York and other cities would look all the better were the painting of house frontages more generally resorted to.

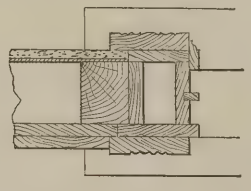
The attractiveness of variation in color of frontages is recognized by architects in their combinations of stone, terra cotta and brick. In a massive business edifice nearly completed in Broadway, New York, between Union and Madison squares, gigantic pillars supporting the lintel of the vestibule at the rounded entrance at corner of building are of gray and white clouded highly polished marble, admirably contrasting with the granite stone and brick of exterior. It is a recognized business principle that appearances pay as attracting attention, where a coat of paint is bestowed on a frontage, and this of cheerful, enlivening hue. Cornices and entablatures of buildings, instead of looking as is usually the case, dull and heavy and of uniform hue when the general surface of a building has been coated with paint, may be as properly touched off with bright colors as the frieze of a room Many of these cornices and entablatures, so far as relief work whether in carving, casting, molding or sculpture, are highly elegant, but these details are mostly lost to notice by uniform dingy aspect. The painting of a frontage affords the occasion to set them off. Paint, too, affords a decided protection to mortar from the weather, and although this is a minor consideration it should not be overlooked. Altogether we need a more extensive "change for the better" in house appearances, and of the character we have noted.



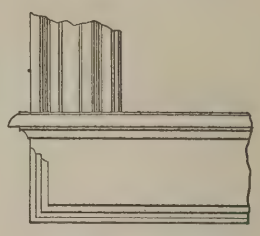
Vertical Section Through Window Frame.—Scale, 1 Inch to the Foot.



Baluster.—Scale, 1 Inch to the Foot.

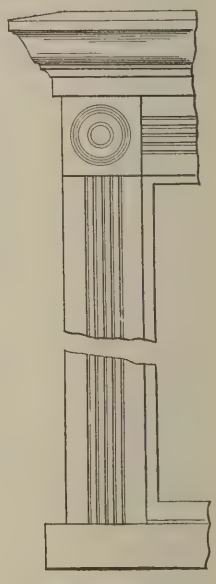


Horizontal Section Through Window Frame.—Scale, 1 Inch to the Foot.

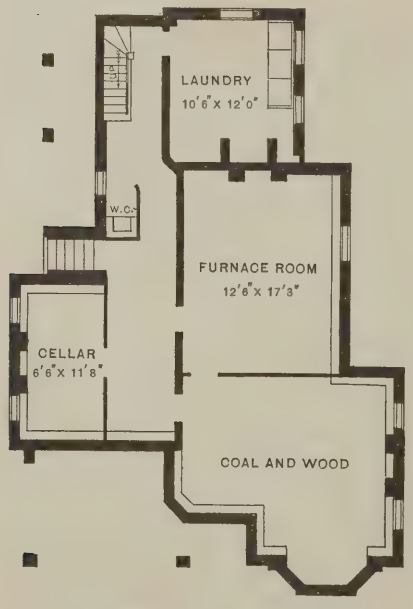


Inside Window Casing.—Scale, 1 Inch to the Foot.

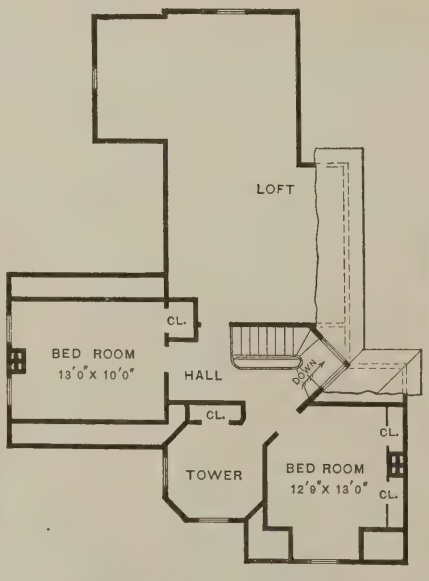
Baseboard.—Scale, 2 Inches to the Foot.



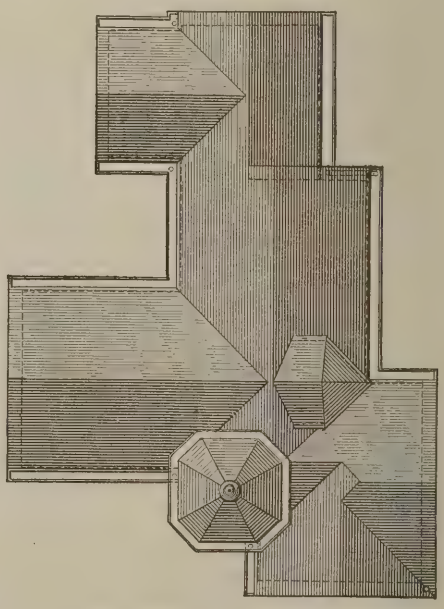
Outside Window Casing.—Scale, 1 Inch to the Foot.



Cellar.—Scale, 1-16 Inch to the Foot.



Attic.—Scale, 1-16 Inch to the Foot.



Roof.—Scale, 1-16 Inch to the Foot.

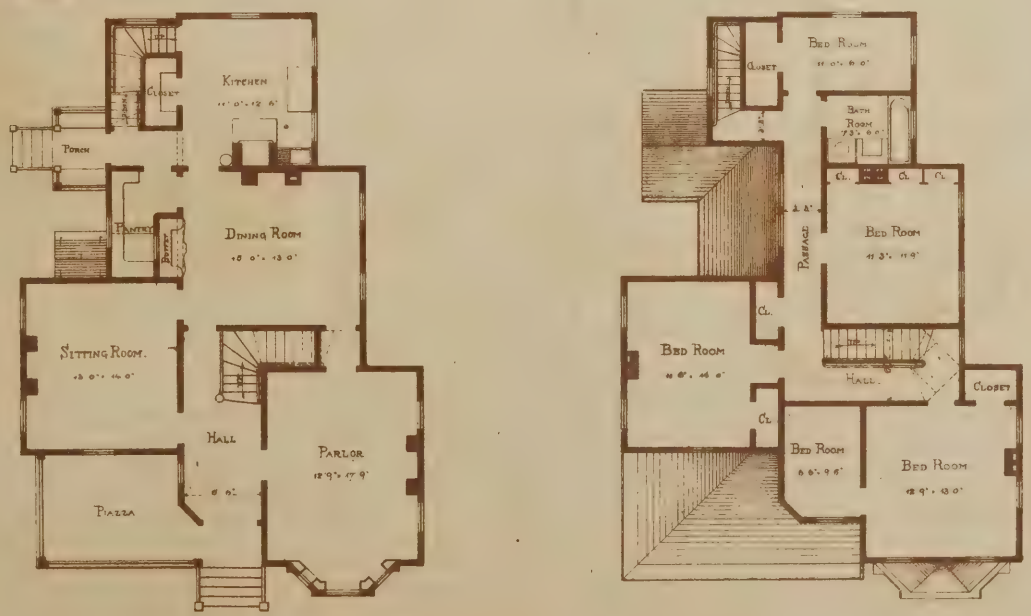
Plans and Details Accompanying House Design by C. Bandtlow, Brooklyn, N. Y.

PLATE V.

HOUSE DESIGNED BY
C. BRANDTLOW,
BROOKLYN,
N.Y.

FRONT ELEVATION

Scale ⅛ inch to the Foot.



—FIRST and SECOND FLOOR PLANS.

Scale 1/16 inch to the Foot.

PLATE VI.

HOUSE DESIGNED BY C. BRANDTLOW.

SIDE ELEVATIONS.—

Scale ⅛ inch to the Foot.

PLATE VII.

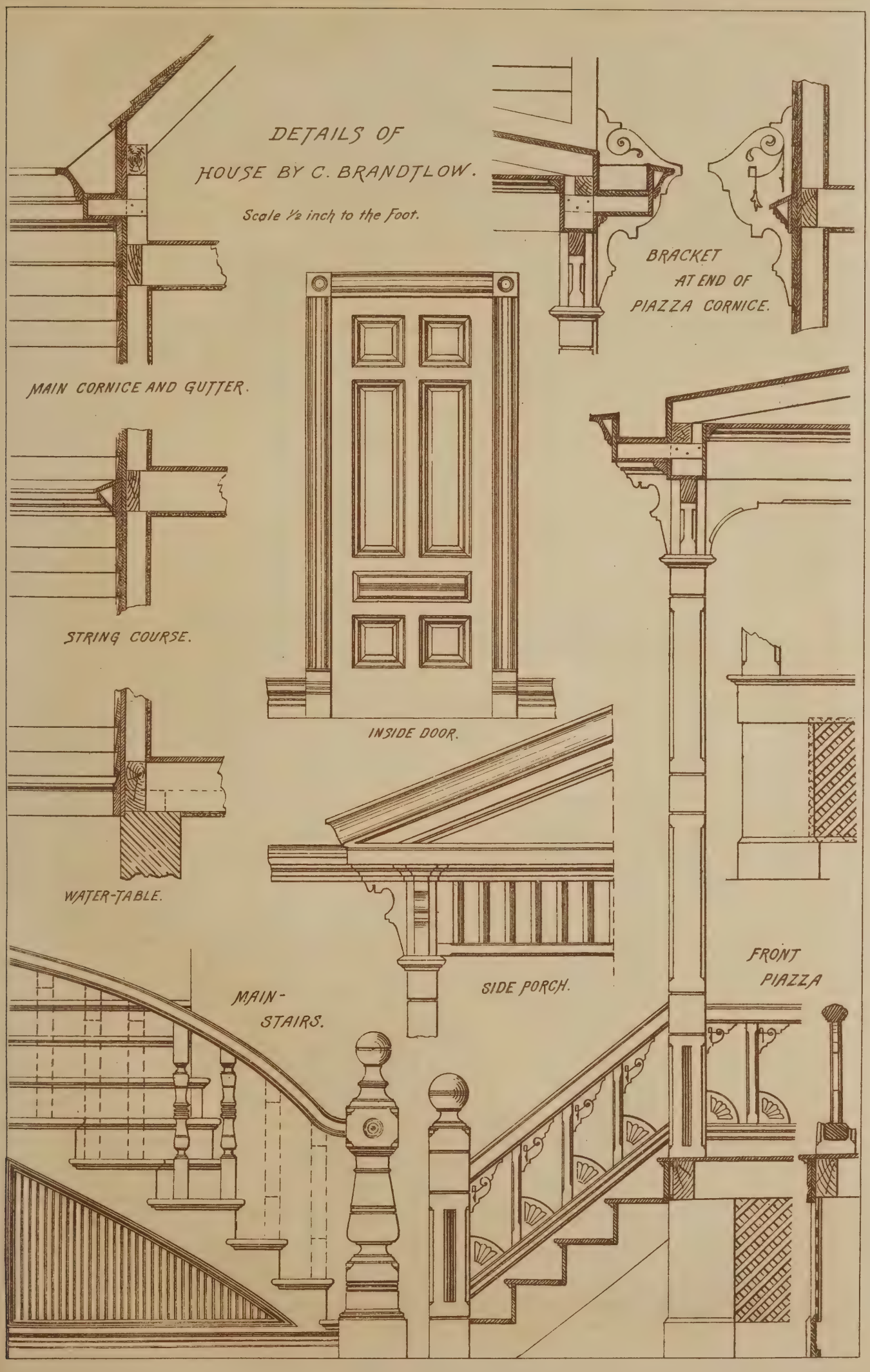
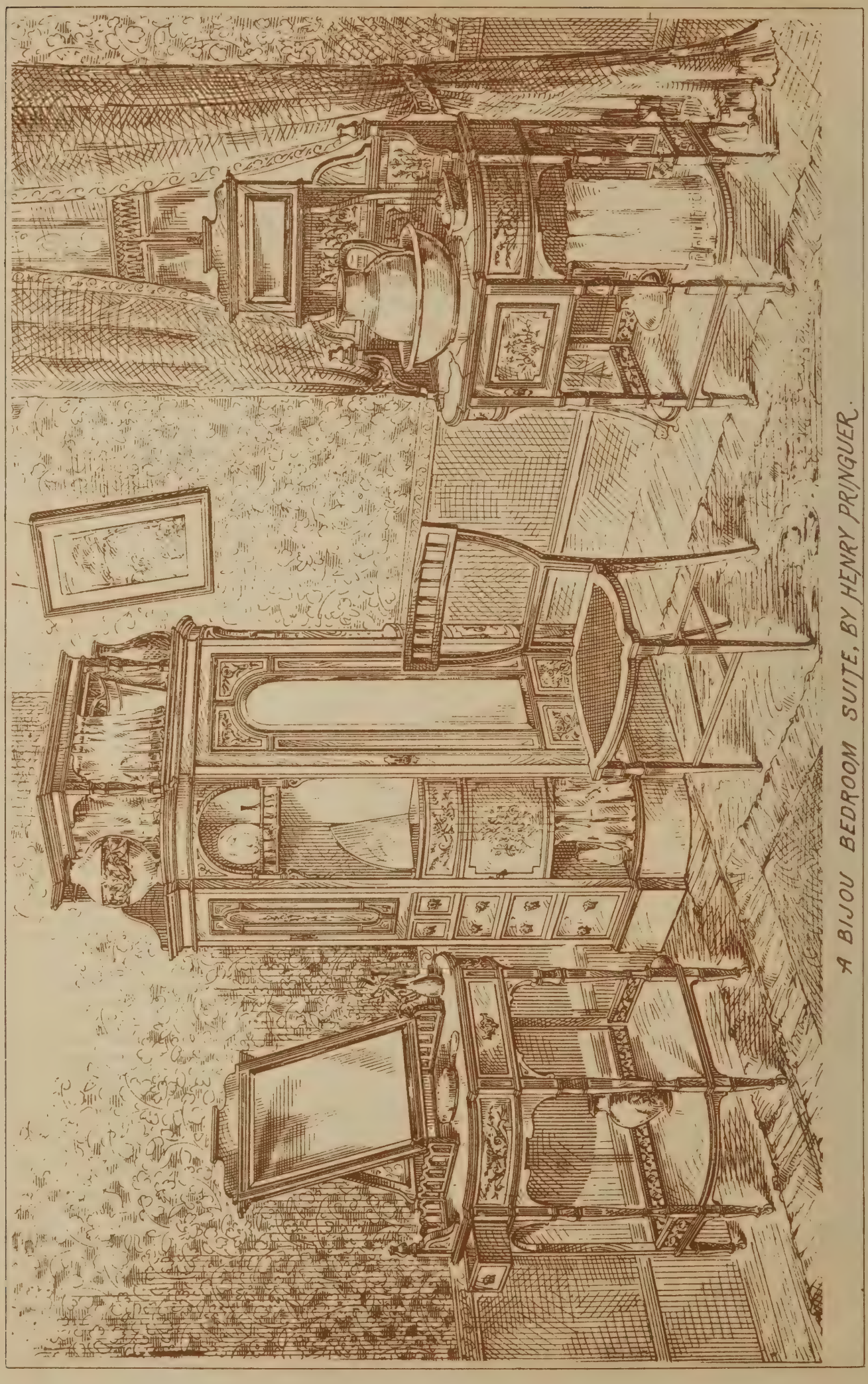

DETAILS OF
HOUSE BY C. BRANDTLOW.
Scale ½ inch to the Foot.
BRACKET AT END OF PIAZZA CORNICE.
MAIN CORNICE AND GUTTER.
STRING COURSE.
INSIDE DOOR.
WATER-TABLE.
SIDE PORCH.
FRONT PIAZZA
MAIN-STAIRS.

PLATE VIII.



A BIJOU BEDROOM SUITE, BY HENRY PRINGUER.

CORRESPONDENCE.

Who Owns The Sand?

From C., *Chester, Pa.*—I am a general contractor and builder. I have contracted to build a large house for which I furnish all the material and labor, with the exception of stone for the cellar wall and piers or foundation. There are also excepted the heater, range, well and pump, mantels and center pieces. In digging the cellar I have struck a bed of excellent sand. Does it belong to me or the owner?

Note.—This is a very interesting question, and one perhaps on which some of our readers who have had experience can throw some light. Without attempting to answer our correspondent's question definitely, we will suggest one or two facts for reflection. It seems that he contracted to build the house, furnishing all the materials except a few items definitely specified. This being the case, what claim has he on the sand which is an unexpected discovery? Another question: Supposing the find had been of some valuable material, but of no use in building, then to whom would the unexpected material belong? Still another question: It is to be supposed that the specifications relating to this house provide that the material excavated should be used in a certain way, perhaps in grading about the building. If the sand taken out of the cellar is used in the building, does the contractor propose to supply the place of the sand with some other material, so as to complete the grading? We incline to the opinion that the sand belongs to the owner, but, on the other hand, he would be a very small man indeed who would refuse to give the contractor at least part of the advantage growing out of this find. As stated at the outset, however, we prefer that our readers should discuss this question.

Tool Boxes.

From S. T. B., *Wellington, Ohio.*—I am disposed to take exception to the statements put forth by Messrs. Chas. Strelinger & Co., of Detroit, Mich., about Yankee carpenters and their heavy tool boxes. I carry a box that weighs just 4½ pounds, and I am perfectly willing to tell my brother chips how it is made. It is constructed of ½ inch basswood, 4 inches wide. The box measures 12 x 26 inches inside dimensions. The bottom is ½ inch thick, and there is a long, slim screw on each of the four upper corners of the box, and in the middle and on the top of the box. On the outside there is screwed a piece about ⅞ inch square and 6 inches long for a handle. Now, when I start off I do not shoulder that box nor do I shove a stick through the handles. I put my tools in the box, the small ones in the bottom, the saws, squares, &c., on the top. Then I tip the box on edge, reach down and across the tools and the top of the box and hook my fingers under the piece on the side. That brings the box between my arm and my hip, and in that position I can carry it as far as any man can carry it on his shoulders. I have seen the baskets used by our English cousins, but I would not swap my box for the best of them.

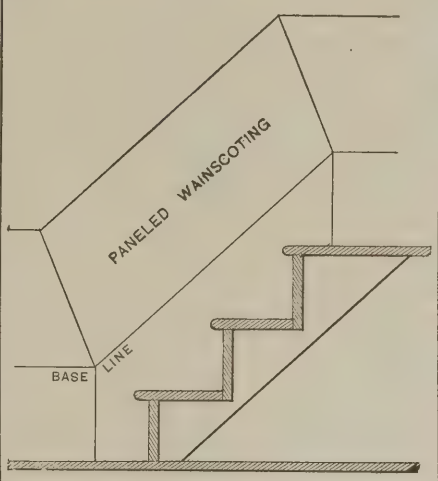
Measuring Stonework.

From J. S., *Ruthven, Iowa.*—Will you please give me some information through *Carpentry and Building* concerning the measurement of stonework?

Answer.—The following general rules for measuring rubble masonry, to which we presume our correspondent's inquiry refers, are given in Vodge's Architects' and Builders' Pocket Companion: "Stone walls are measured by the perch, *i. e*, 16 feet 6 inches long, 12 inches high, and 18 inches thick, equal 24¾ feet cubic measnre. It is frequently agreed, however, to count the perch at 25 cubic feet for the convenience of measurement. Net measurement is that where all openings through the walls are deducted, and 24¾ feet (cubic) allowed to one perch. Gross measurement is that where no openings under one perch are deducted, and 25 cubic feet allowed to one perch. When openings are deducted, it is generally agreed to allow a compensation for plumbing and squaring the jambs, and for the sills and lintels. It is customary to measure all foundation stone and dimension stone by the cubic foot, and all sills, lintels, base courses, water-tables, and ashlar, by the foot superficial and by the foot lineal."

Construction of Wainscoting.

From R. H., *Newark, N. J.*—I desire to inquire which is the best method of getting out wainscoting as indicated by the accompanying sketches. Is it best to cut it out by means of the intersecting lines as shown in



Construction of Wainscoting.—Fig. 1.—*Plan of Intersecting Lines.*

Fig. 1, or by plumb-lines from the bottom at the top risers, as shown in Fig. 2? In the case in point, I am obliged to have an 8-inch baseboard to work to. I am a young man working under instructions and desire to obtain all the information possible. I have seen wainscoting got out both ways, and those who have done the work seem to be in position to argue that both methods are right.

Answer.—We have engraved our correspondent's sketches and present them herewith for the inspection of our readers. For

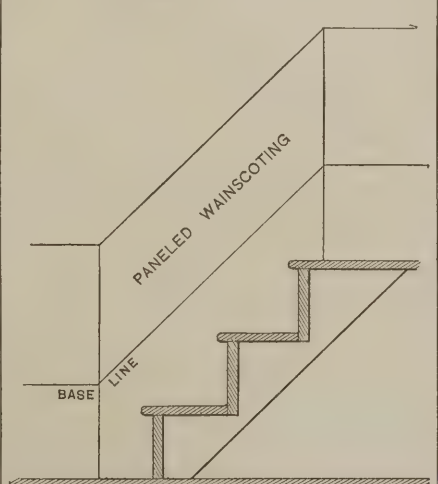


Fig. 2.—Plan of Plumb Lines.

ourselves we are not prepared to say that either method is right or that either one is necessarily wrong. We can imagine cases where it would be much better to employ one of the methods rather than the other, and on general principles some might prefer the looks of the work when done by one plan, while they would object to work done by the other method. The question raised is like many others in carpentry in which there is no absolute right or wrong. Speaking in the most general terms, our own preference would be for some such plan as is indicated in Fig. 2. It would seem to be more in keeping with the railing or balustrade of the stairs. We shall be glad to have our readers give this subject such consideration as may please them.

Arrangement of a Planing Mill.

From J. H. P., *Oneida, N. Y.*—There was published in a recent issue of *Carpentry and Building* a plan from "S. W. C.," of Yonkers, N. Y., showing how he would arrange a wood-working establishment. I differ from this correspondent in some of his opinions. I think I am justified in my own conception of how machinery should be arranged for the purpose named, since I have had some 20 years' experience in setting up machinery and managing wood-working establishments. Your correspondent's idea with regard to the general arrangement of the machinery is good. However, the jointer should be turned the other way about, and the line shaft would be run with the top toward the back of the mill. Otherwise it will be necessary to use cross belts. There is not a planer or saw made the same way the lumber is to go. The planer head runs the top from the door, and the same is true with the saw and the sticker.

Foot and Hand Power Machinery.

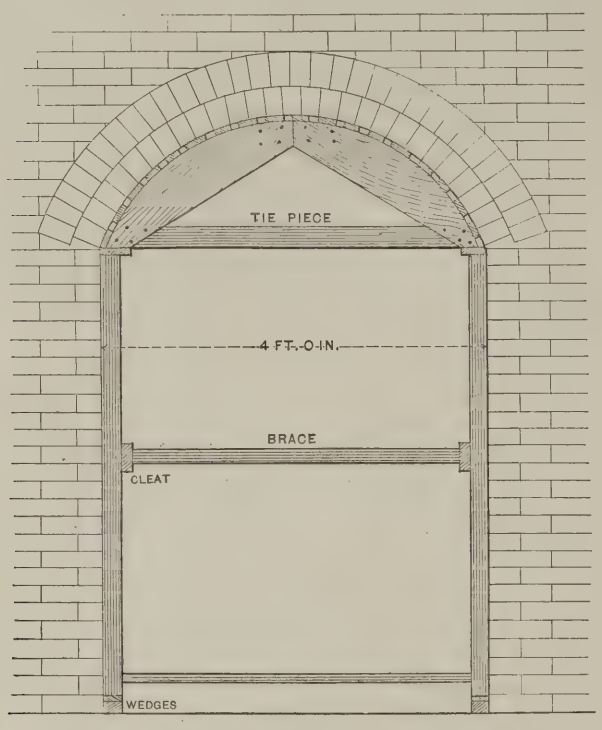
From T. A., *Newark, Del.*—Will you please give, through *Carpentry and Building*, your opinion of foot and hand power machinery for carpenter shops? If the machines do as well as the manufacturers claim they are certainly very desirable.

Answer.—Whether the foot and hand power machines advertised by numerous makers in different sections of the country fully come up to the high name given them, or only partially attain that state, they are still very useful, and are entitled to attention when considering the equipment of small shops. Steam-power is certainly the best for use in large shops or where there is a constant supply of work, so that the machinery can be kept in motion all the time, but outside of this there is a demand for machines where steam-power is an impossibility, or where the work is so small in amount that to keep steam ready at all times would lose the saving to be effected. In giving our correspondent our opinion in the matter we would say, first, that we recommend machinery wherever it can be introduced. This is the machinery age, and men cannot expect to compete with machinery by hand work, and therefore every enterprising concern must have the very best machinery that is available for the purpose. Having decided, therefore, that machinery is desirable for use, the next thing to consider is the kind of machinery, whether it should be foot and hand power or steam-power in character. This question, as already described, is to be determined by local circumstances. Hand-power machines gain greatly over hand tools, and they are to be preferred in all cases except where steam power is more profitable to use. Comparatively few men we think at the present time are making the mistake of using hand and foot power machinery where they should use steam power, and yet in the near future with the largely increased number of establishments equipped with machinery there is danger of this state of affairs arising. While speaking on this subject we should remind our readers that there is scarcely any machine so cheap at the present time as a steam engine and boiler. For the most part fuel is also cheap, and the care necessary to be exercised over steam engines and boilers has been reduced to a minimum by safety appliances, and the men who are competent to take charge of a steam engine are many more in number at the present time than formerly. These circumstances would justify many in undertaking to equip their establishments with steam power at the present time who could not afford it in the past. A considerable number of the so-called hand and foot power machines now on the market are adapted to be run by steam power also in case it is desired to do so. Therefore in deciding the question one can scarcely make a mistake at the outset by buying hand power machinery with the idea of putting in steam power

whenever it can be afforded, for the same machines can be run by steam, or in most cases sold or exchanged for steam power machinery.

Practical Centering.

From O. B. M., *New York.*—Continuing the consideration of centers for supporting segmental arches from 3 feet span and upward, an arch is shown at Fig. 1 turned on its necessary center. The construction of this center is a matter of more difficulty and labor than the two described in the number for December, as there is involved the principal of a trussed frame. The center is formed of two frames like that shown, the face side at Fig. 1, and the reverse side at Fig. 2, consisting of four pieces each—namely, two principal bearers curved on edge to the required arc, and two tie pieces, one across the vertical joint directly under the crown and key brick to hold the bearers together, and a tie or foot piece to prevent the feet from slipping when weighted above. The binding cleats across the bottom and battens are as before described. To construct this frame, which is employed when the hight of the arch to the soffit exceeds the width of an ordinary board, it is usual to describe the curve in the same way as before, using a rod or trammel on a drawing board or floor, and to mark the lines shown under the bevels on on Fig 3 in such a manner that the 1-inch board which is suitably wide enough can be applied, taking care that there will be enough stuff on to cut out the curve. Then by tacking this board to the floor with its bottom edge to the indicated lines, the curve can be struck from the center A, Fig. 3. Squaring up from the spring line and from the center A, the plumb joint and bevel at the crown will be found, likewise the foot bevels can be found on the spring line. Fig. 4 is a sketch of a board marked ready for sawing out the piece. Care must be taken to have the beveled butt joints and curved edges perfectly square from the face, otherwise the whole construction will be twisted and unfit to sustain an arch whose soffit is intended to be level. Proceed to prepare the upper binding piece and lower tie, each about 3 inches wide and 1 inch thick, and to nail them on to the bearers after the manner of Figs. 1 and 2, using 8d clinch nails, and turning their points when driven to insure a firm and stable frame, also dress off the upper piece to the curve of the bearers. Construct another similar frame to constitute a pair, and place them parallel to each other at a distance apart equal to the thickness of the intended arch, as shown at Fig. 5. Nail on spared battens and bottom cleats as before illustrated, and the center will be complete and ready for setting in position.



Practical Centering.—Fig. 1.—Simple Segmental Arch with Center in Place.

In order to set this center four uprights will be necessary, one under each corner of the center proper resting on thin double wedges placed on a block, as shown at Figs. 1 and 6. These are cut to the hight of the spring line, less the thickness of cross cleats, and are also toe-nailed to them. On the opposite faces of the uprights cross blocks are affixed spanning the two uprights, between and against these blocks the required brace is tightly driven. By employing cross-blocks the necessity of using two braces is obviated, with the same results that is pressing the uprights firmly against the jambs by the braces acting on the blocks. Should the lower ends of the uprights spring out by the pressure of the upper brace on their middle part another brace can be placed, as indicated. The construction of the center proper is more clearly shown in section at Fig 6, representing as it does the brick rowlocks or rings constituting the arch resting on the battens, the battens on the frames, frames on cleats, cleats on uprights and uprights on wedges The object in using the latter under the uprights is to gradually lower the center by allowing it to fall by its own weight from the superstructure above, so that the different brick may come by degrees to their bearings without a too sudden application of the weight exerted on the extrados or upper side of the arch. It is best to allow the center to remain some time in position, as removing it too soon endangers the arch, which is never reliable until the mortar is thoroughly set. Wedges, therefore, permit of convenient and early easing yet still keep the work secure. Fig. 7 represents the center for a semicircular arch of the same span and character as Fig. 1. It is similarly constructed excepting as regards the curved bearers, each of which occupies a quadrant of one-half the semicircular curve, Fig. 8. In connection with this it will be noticed that when the center is a part of a circle, a semicircle, a quadrant, &c., the bevels of the bearers will be equal. In this case the bevel is an angle of 45°, as the bottom edges are the two sides of a square.

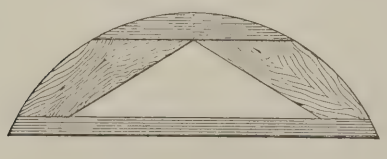


Fig 2.—Elevation of Inside of Center.

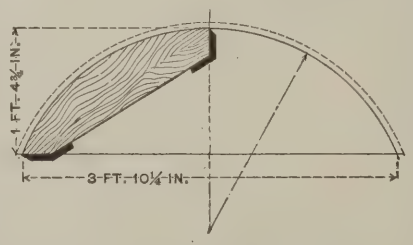


Fig. 3.—Method of Obtaining Bevels.

This is also the case with centers when the bottom edges form a semi-hexagon, semi-octagon, and so on with all polygon figures. In setting this center the same process as has been just described is repeated, but if the opening be low the wedges can be omitted.

Fig. 4.—Half-Curve of Frame.

Building Mortar.

From C. W. B., *New York.*—My attention has been called to the article which appeared in the September number of *Carpentry and Building* on the question of mortar, or more particularly the subject of slacking lime. I am not able myself to answer the question there raised, but in my reading, I have recently encountered some general particulars concerning building mortar that may perhaps interest some of the readers of the paper. The article to which I refer, is, in a measure, an abstract of the opinions and results of investigations conducted by Mr. Smeaton, an English writer upon building subjects. Concerning the phenomena attending the slacking of lime, the following remarks occur:

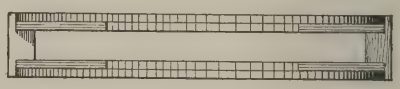


Fig. 5.—Plan of Frame Center.

"When carbonated lime has been thoroughly burnt it is deprived of its water, of all or nearly all of its carbonic acid; if in this state it is plunged into water and immediately taken out again, the water which it has absorbed will occasion the mass to crack and become excessively hot, and at length to fall into an impalpable powder, much of the water being carried off in the form of steam during the process. When the lime has been slacked, if it is beaten up with a little water into a very stiff paste and allowed to dry, it will be found that the white lines, whether from chalk or marble, never acquire any degree of hardness, that the brown lines become considerably indurated, though not as much so as when mixed with sand, and that shell lime (procured by calcining sea shells) concretes into a firm, hard cement, well qualified for dry building, although it falls to pieces in water."

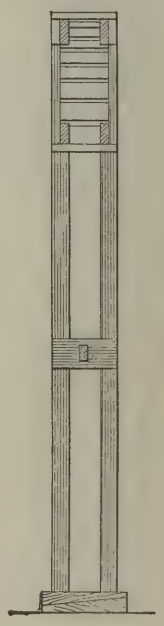
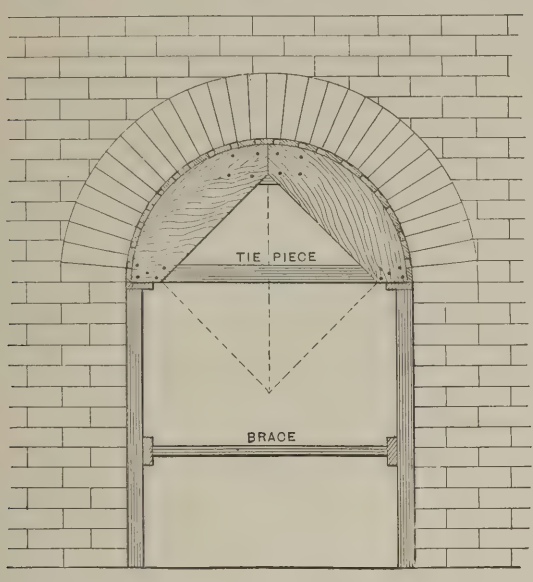


Fig. 6.—Section of Center Through Crown.

The same author, in speaking of the methods of preparing mortar, contrasting the modern plan with that of the ancients, presents the following: "The method of preparing common mortar is also extremely imperfect. The lime being slacked by the addition of water, and the unburnt lime being broken down and mixed with the rest, a large quantity of dirty sand is added, and the whole being incorporated by means of a spade is reckoned to be fit for use; thus the principal point in the making of mortar—namely, beating the ingredients together so as to mix them thoroughly, is slurred over in a hasty, careless manner, and the result, as might be expected, is a crumbling mass scarcely fit for use. The Roman builders, on the other hand, after

they had mixed together the materials, employing for this purpose a smaller proportion of water than is customary at present, put the mass into a large wooden mortar, and beat it till it ceased to adhere to the heavy wooden or iron pestle which was used on the occasion. Fresh made mortar, if kept under ground in considerable masses, may be preserved for many months without injury; and the older it is before it is used the better, the builder taking the precaution to beat it up afresh previous to using it; for it not only sets sooner, but acquires a greater degree of hardness and is less apt to crack. Pliny informs us that the ancient Roman laws prohibited builders from using mortar that was less than three years old, and to this circumstance he expressly attributes



Practical Centering.—Fig. 7.—Center of Horizontal Arch.

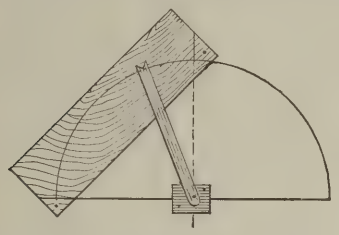


Fig. 8.—Striking the Curve.

the remarkable firmness of the oldest buildings in the city. A similar law prevailed, and, we believe, still prevails in Vienna, requiring the mortar to be a year old before it is employed. But there is nothing which shows in so striking a point of view the advantage and necessity of beating mortar, and that the effect produced is owing to something more than a mere mechanical mixture of the ingredients, as the preparation of grout or liquid mortar. This differs from the common mortar only in containing a larger quantity of water, so as to be sufficiently fluid to penetrate the narrow, irregular cracks and interstices of rough stone walls, and is generally made by diluting common mortar with water either cold or hot. It not infrequently happens that this grout refuses to set, and at all times it is a long while in acquiring the proper hardness; but if, instead of common mortar, that which has been long and thoroughly beaten is employed, the grout will set in the space of a day, and soon after acquire a degree of hardness much superior to what is made in the common manner."

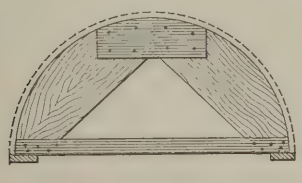


Fig. 9.—Elevation of Inside of Center.

Mission of Carpentry and Building.

From G. W., *Rock Falls, Ill*.—I have just subscribed for another year to *Carpentry and Building*, because on examination of other publications intended for the use of carpenters and builders, I find it of more practical use than all the rest put together. *Carpentry and Building* not only furnishes all the plans for both cheap and costly houses, equal or superior to those in * * * or in * * *, but gives all the details necessary for their construction without the intervention of an architect. This, as I understand it, is the distinctive feature of *Carpentry and Building*. It is looked upon as *the* journal for carpenters and builders, and not especially a paper intended for architects. There is no reason why you should despoil your own work for the purpose of appeasing the architects, or for any other reason. There are hundreds of carpenters among your readers where there is one architect. The carpenters are all pleased with your journal because it suits their necessities. On the other hand, the architect is jealous of those who furnish plans to the paper, and may even denounce you for the publication of details. However, there is no necessity for any ill feeling between architects and builders, but no editor can escape censure who draws the line between them and intimates that the architect is superior in mental education or other attainments, to such an extent that the public should defer to his taste in matters where both have equal means of information. The practical builder is seldom a draftsman. He would prefer to take the plans of the architect, but, in carrying out minor details, I can see no reason why his judgment should not be as valuable as that of the supervising architect

Pointing Stonework.

From J. S., *Ruthven, Iowa*.—I would like to ask the readers of *Carpentry and Building* if in their estimation it falls to the stonemason to point up his work when it is not so stated in the bargain.

Note.—We are disposed to refer this question to our readers, although it is one on which opinions may differ, and to which no answer entirely satisfactory can be given. The bargain may be a written agreement or a general understanding. In one case it may refer to a specification, and in the other it may depend in a great measure upon the custom which prevails in the community in which the work is to be done. If pointing is demanded by the nature of work, or upon general principles owing to the custom prevailing, it would seem to fall to the stonemason rather than to any other mechanic. Our correspondent's use of the word "bargain" is somewhat equivocal. We presume that the difficulty in some case that he has in mind grows out of the fact that the bargain was rather indefinite in character.

Hatchet and Saw.

It is not often that the correspondents of *Carpentry and Building*, who are supposed be an eminently practical set of men, indulge in rhyme. For the most part their trade is matter of fact in character and somewhat prosy. Occasionally, however, we encounter a contributor who affects the muse, and who writes in rhyme with the same facility that others express their ideas in plain prose. We have recently received a communication from a new contributor that is of more than average merit, judging it by others of its class, and we present it below in the belief that many of our readers will enjoy its perusal. Some of the conceits of the author are very happily expressed, and his introduction of certain idioms of the trade is very apt:

From W. S. B., *Flemingston, N. J.*:

Saw said to Hatchet: "One day we were new,
You cut very keenly, I sawed very true;
Mostly together we are taken here and there,
Often for a companion we have the 'Big Square,'
Who generally does a good deal of 'standing around,'
Against some timber, or trestle, or else lying down,
While I, the Saw, keep steadily sawing and 'ripping,'
And friend Hatchet is kept constantly 'chipping'
All kinds of timber, both soft and hard wood,
And oft it is said 'we don't cut very good,'
By our master, who is inclined, we think, to lie
About us, especially if the 'Bosses' are by,
And say I, the Saw, needs 'filing and setting:'
That friend Hatchet needs 'grinding and whetting.'
Or, if strangers are by, thus our master will speak.
We ask were we dull? for we are yet used a week
Without the least filing, without the least grinding,
Till friend Hatchet 'haggles' and I get to 'binding.'
Then comes a rainy day, work somewhat lagging,
When he will sharpen us, and of us heard bragging,
How I, the Saw, nicely saws, how friend Hatchet cuts;
That we 'beat all the new ones ever so much.'
But during this time he's been bragging of 'Square,'
About whom he is heard never to swear,
But speaks of it oft as being 'plain-figured' and true,
And, if rightly used, it's mistakes they are few.
If a 'tenon' or 'shoulder' is not rightly done,
Our master who did it says, the 'plagued Saw run,'
Cries, 'Hand me a Hatchet, the tenon's too full,
I can't cut it now, my hatchet's so dull.'
It's because he's awkward is why thus he exclaims;
To screen himself from censure the Hatchet he blames.
Thus we are exposed from morning till night—
All that we do is never quite right.
I am sawed on nails, on mortar, on bricks,
Friend Hatchet by the same means gets full of nicks.
Thus, you see, we are abused day after day,
While Square with his 'two feet' lies around in the way,
Taking thing easily. Of course there are cases
When it 'squares off' 'studding, cripples and braces,'
Then again it will stand while we are kept working.
It wouldn't be right for us to say it was shirking,
For our master would say it is 'well versed in 'figgers,'
Not caring how I, the Saw, or friend Hatchet 'niggers.'
We, too, are glad of Square's 'fortune,' but why should it feel
'So much above us?' we're all made of steel.
To get on 'Saw-teeth' with Square, I, the Saw, never would,
And friend Hatchet's 'temper' is exceedingly good.
So we let it all pass, and consider the source,
And get along very much better, of course,
Than we otherwise would if we should make mention
Of ways we are used that would stir up contention.
We own that we feel hurt, friends; wouldn't you?
After working on timber the whole summer through,
And when the structure is framed, raised and complete,
Bystanders will say, How nicely all the joints meet!
Then our master begins to assert and declare
He can cut any 'Angle' with the 'Big Square,'
And how useful it is when framing a 'truss.'
But of friend Hatchet and I he says nothing about us,
Unless it be this, he loves to find fault.
But we'll say nothing further; we now 'call a halt.'
You've seen how we've been treated, but we don't so much care;
Only we think we haven't been used quite 'square'"
Thus people are oft treated in a similar way.
Some work but little; others work the whole day.
They who work but little get the "laurels and jewels."
They who work hardest are oft considered "poor tools."

Plastering.

From C. W. L., *Dolgerville, N. Y.*—For the benefit of your correspondent "F. B.," I will briefly state what I consider to be a good job of plastering. Dry finish, in my opinion, makes the best work that can be done. The first coat should be laid on as level as possible; then it should be well scratched, and then left until perfectly dry before the next coat or browning is put on. That, in turn, should be allowed to dry before the finish is put on. In green finish the first coat should be followed up with browning quite poor and sandy. The whole should be "darbied" and left to dry. One coat in this way makes a very good job, provided it is floated at the right time, and then left until dry enough to put on the finish. In making mortar, fresh lime and sharp sand should be used. The quantities to be used depend upon the strength of the lime and the quality of the hair and sand. No carpenter ought to be allowed to work in a building until the plastering has become dried and hard. Then an ordinary jar will not do any damage. I do not wish to be critical, nor to say anything likely to give offense, but I think it bad both in theory and practice to let the first coat of plastering stand a day or so or until partially dry, and then to put on a second or browning coat. Under these conditions the two coats will never properly unite. Plastering should be either dry finish or green finish. No half way ought to pass muster. From what I have written your correspondent should be able to draw his own conclusions.

Cements for Rubber and Leather.

From E. E. M., *Jordan, N. Y.*—Will you kindly inform me through *Carpentry and Building* what liquid is used to cut gum rubber in making rubber cement for repairing rubber and leather boots?

Answer.—In answer to our correspondent's inquiry, we present the following recipe: A solution is first prepared by allowing 10 parts of caoutchouc to dissolve in 280 parts of chloroform. Another solution is then prepared by cutting 10 parts of caoutchouc into small pieces, and melting with 4 parts of rosin. Two parts of gum turpentine are then added, and the mass is finally dissolved in 40 parts of oil of turpentine. Both solutions are then mixed together. To repair a hole in a rubber shoe or waterproof garment a piece of close linen is dipped in the cement and laid upon the place to be repaired, which has been previously brushed over with the cement. As soon as the linen adheres the cement is applied and smoothed. A method for preparing cement for repairing leather, is as follows: A solution of gutta-percha in bisulphide of carbon of the consistency of syrup, and sufficiently diluted with petroleum, does excellent service. A thin layer of the cement is applied and the pieces of leather are tightly pressed together.

Hot-water Heating.

From G. D. M., *Muscatine, Iowa.*—I would be glad if some of the correspondents of *Carpentry and Building*, who have had experience in heating with steam and hot water, would give a talk on that subject.

Note.—If our correspondent has been an attentive reader of our volume for last year, he has no doubt noticed several articles upon this general subject, which were published in the interval named. These, however, came from manufacturers of apparatus, and did not state specifically the experience of users of the apparatus. Perhaps our correspondent desires statements of experience from this standpoint. We shall be glad to have our readers answer the question as to them may seem best. The question is one, however, of many technicalities, and there are comparatively few who can give any useful advice except those who have made it a special study.

REFERRED TO OUR READERS.

Stock Barn.

From J. C. C., *Pine Ridge, Dak.*—Will some reader of *Carpentry and Building* present a plan for a stock barn, to be built of wood, to accommodate 12 cows and 4 horses? All to be under one roof. The building should be two stories high, and the second story to be used for hay exclusively. I want advice concerning general arrangement, plan of ventilation, &c.

Cypress Timber.

From S. O. E., *Evergreen, La.*—Will you kindly correct in the next issue of *Carpentry and Building* some statements in my letter, published on page 212 of the last volume. Cypress sometimes shrinks endwise as much as ½ inch in 10 inches. Sills 20 feet long will sometimes spring as much as 6 inches in sawing.

Filing Saws.

From R. M., *Grand Forks, Dakota Territory*—I desire to lay before the practical readers a dispute which I heard a short time since. The dispute was between two very good carpenters. The question is, Toward which end of a common cut-off hand-saw should the point of the file incline in filing? What is desired under the circumstances is a definite answer, which will amount to a decision in the dispute.

NEW PUBLICATIONS.

Modern Architectural Practice; Part 1. A large modern house by Bruce Price, Architect. 24 plates, 11 x 14; 13 pages of letter press, illustrated by perspective sketches; stiff covers, muslin back. Published by W. T. Comstock; price, $5.

We alluded to this work in our last issue. It forms the first of a series to be brought out by the publisher named relating to modern architectural work. This book differs from others of the same character which have preceded it from the fact that it represents work which has actually been built. In the preface, the author directs attention to the features of architecture which have prevailed in America up to the present time and the characteristics which should distinguish buildings of the present time. The house shown is one that has been built at San Mateo, Cal. The initial pages of letter press contain the specification which accompanied the work. These, as indicated in the formal description above, are embellished with numerous free-hand sketches, illustrating different parts of the construction of the building. Many things occur in this part of the work that are of interest to builders, and the specification, in this respect at least, is one that may be followed with good effect by architects in general. The first plate contains a perspective study of the building, looking south. The second contains another perspective less finished in the drawing, and taken from a different point of observation. The third contains a perspective, looking north, while the fourth has an elevation and the first-floor plan. Other floor plans and elevations follow in succeeding plates, after which are given the details to scale of ¼ inch to the foot and larger. These are drawn with remarkable clearness, and have suffered nothing at the hands of the engraver. Perspective sketches of different parts of both interior and exterior are introduced on some of the plates, in order to better show the effect that the designer desires to produce. The twelfth plate is devoted to a general view of the fireplace in the entrance hall. Something that is introduced in this work that is not usually found in similar books is a vertical cross-section through the house, showing the framing of the building, the foundations, the interior finish, grades, &c. A perspective view in the dining-room is supplemented by elevations of the different walls, containing details of the decorations. The windows, doors and wainscoating, and also mantels, base-boards, &c., are all

TABLE OF NUMBER OF JOISTS AND NUMBER OF FEET (IN GIVEN LENGTH AND WIDTH OF BAY) OF 2 x 4 INCH JOIST, SET 16 INCHES FROM CENTERS.

Allowance is made for 6 inches at each end to rest in or on the wall, and one joist each side of bay.

Length of joist.	L'gth of bay.	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of feet in each additional joist.
	Width of bay.	4' 2"	5' 6"	6' 10"	8' 2"	9' 6"	10' 10"	12' 2"	13' 6"	14' 10"	16' 2"	17' 6"	18' 10"	20' 2"	21' 6"	22' 10"	24' 2"	25' 6"	26' 10"	28' 2"	29' 6"	30' 10"	
5	4	13⅓	16⅔	20	23⅓	26⅔	30	33⅓	36⅔	40	43⅓	46⅔	50	53⅓	56⅔	60	63⅓	66⅔	70	73⅓	76⅔	80	3⅓
6	5	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	4
7	6	18⅔	23⅓	28	32⅔	37⅓	42	46⅔	51⅓	56	60⅔	65⅓	70	74⅔	79⅓	84	88⅔	93⅓	98	102⅔	107⅓	112	4⅔
8	7	21⅓	26⅔	32	37⅓	42⅔	48	53⅓	58⅔	64	69⅓	74⅔	80	85⅓	90⅔	96	101⅓	106⅔	112	117⅓	122⅔	128	5⅓
9	8	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	6
10	9	26⅔	33⅓	40	46⅔	53⅓	60	66⅔	73⅓	80	86⅔	93⅓	100	106⅔	113⅓	120	126⅔	133⅓	140	146⅔	153⅓	160	6⅔
11	10	29⅓	36⅔	44	51⅓	58⅔	66	73⅓	80⅔	88	95⅓	102⅔	110	117⅓	124⅔	132	139⅓	146⅔	154	161⅓	168⅔	176	7⅓
12	11	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	8
13	12	34⅔	43⅓	52	60⅔	69⅓	78	86⅔	95⅓	104	112⅔	121⅓	130	138⅔	147⅓	156	164⅔	173⅓	182	190⅔	199⅓	208	8⅔
14	13	37⅓	46⅔	56	65⅓	74⅔	84	93⅓	102⅔	112	121⅓	130⅔	140	149⅓	158⅔	168	177⅓	186⅔	196	205⅓	214⅔	224	9⅓
15	14	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	10
16	15	42⅔	53⅓	64	74⅔	85⅓	96	106⅔	117⅓	128	138⅔	149⅓	160	170⅔	181⅓	192	202⅔	213⅓	224	234⅔	245⅓	256	10⅔
17	16	45⅓	56⅔	68	79⅓	90⅔	102	113⅓	124⅔	136	147⅓	158⅔	170	181⅓	192⅔	204	215⅓	226⅔	238	249⅓	260⅔	272	11⅓
18	17	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	12
19	18	50⅔	63⅓	76	88⅔	101⅓	114	126⅔	139⅓	152	164⅔	177⅓	190	202⅔	215⅓	228	240⅔	253⅓	266	278⅔	291⅓	304	12⅔
20	19	53⅓	66⅔	80	93⅓	106⅔	120	133⅓	146⅔	160	173⅓	186⅔	200	213⅓	226⅔	240	253⅓	266⅔	280	293⅓	306⅔	320	13⅓
21	20	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	14
22	21	58⅔	73⅓	88	102⅔	117⅓	132	146⅔	161⅓	176	190⅔	205⅓	220	234⅔	249⅓	264	278⅔	293⅓	308	322⅔	337⅓	352	14⅔
23	22	61⅓	76⅔	92	107⅓	122⅔	138	153⅓	168⅔	184	199⅓	214⅔	230	245⅓	260⅔	276	291⅓	306⅔	322	337⅓	352⅔	368	15⅓
24	23	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	16
25	24	66⅔	83⅓	100	116⅔	133⅓	150	166⅔	183⅓	200	216⅔	233⅓	250	266⅔	283⅓	300	316⅔	333⅓	350	366⅔	383⅓	400	16⅔
26	25	69⅓	86⅔	104	121⅓	138⅔	156	173⅓	190⅔	208	225⅓	242⅔	260	277⅓	294⅔	312	329⅓	346⅔	364	381⅓	398⅔	416	17⅓
27	26	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	18
28	27	74⅔	93⅓	112	130⅔	149⅓	168	186⅔	205⅓	224	242⅔	261⅓	280	298⅔	317⅓	336	354⅔	373⅓	392	410⅔	429⅓	448	18⅔
29	28	77⅓	96⅔	116	135⅓	154⅔	174	193⅓	212⅔	232	251⅓	270⅔	290	309⅓	328⅔	348	367⅓	386⅔	406	425⅓	444⅔	464	19⅓
30	29	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	20
31	30	82⅔	103⅓	124	144⅔	165⅓	186	206⅔	227⅓	248	268⅔	289⅓	310	330⅔	351⅓	372	392⅔	413⅓	434	454⅔	475⅓	496	20⅔

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shown in the pages which complete the work. Altogether, it is one of the most satisfactory works on architectural details that has been presented in a long time.

COUNTRY AND CITY HOMES. By David Salfield. 80 pages Published by the author. Paper, 50 cents. Bound in cloth, $1.

This little book contains a series of dwellings, public buildings, &c., declared by the author to be in the modern style of architecture. It contains 28 designs, ranging from a three room city cottage to a county hospital. The preliminary chapters address the readers upon the importance of employing an architect, and contain the schedule of charges adopted by the American Institute of Architects. In presenting the latter, the author makes use of an expression which creates surprise if nothing more. We quote, "Schedule of charges adopted by the American Institute of Architects all over the United States and Europe." It will surprise some of the fellows of the Institute, we dare say, that their schedule of charges extend not only all over the United States, but also all over Europe. The drawings throughout the book are on the left-hand pages, and are faced by brief descriptive text on the right-hand page. The style of architecture is of the kind which pertains more particularly to the Pacific Coast, and accordingly the book will be regarded as a novelty in some respects by its readers in the East. Each design is signed by the author of the book, and throughout the impression is created that the work is in its main features an advertisement of his business rather than a contribution to the literature of the art. Numerous advertising pages are sandwiched into the book, and go to swell its size.

VICKS' ILLUSTRATED MONTHLY MAGAZINE AND FLORAL GUIDE.

The January issue of this magazine inaugurates the tenth volume. The issue contains 176 pages, and is in the usual high style of art peculiar to the establishment which puts it forth. The illuminated plates are quite as attractive as usual. The first of these illustrates borders and bedding plants. Another is devoted to pansies, and is a very successful piece of chromo lithography, the colors being very brilliant. Among the literary contents is an article on the training and pruning of vines, and a prize essay on asparagus, and one with reference to planting grounds. The latter is of interest to all who have to do with the designing and management of country places. An illustrated article shows some of the business features of the establishment putting it forth. The engravings present views in the mail room, where letters are being opened, registering orders, filling orders, packing-room and file-room.

MECHANICS OF THE GIRDER; a Treatise on Bridges and Roofs. By John D. Crehore, C. E. Size 5¼ x 9¼ inches, 575 pages. Published by John Wiley & Sons. Price $5.

The late Mr. Crehore's work is an extensive volume and defies being reviewed in anything approaching the manner which its importance warrants in the necessarily brief space at our command. Bristling with mathematics the book will prove discouraging to the average reader and will scarcely constitute a popular source of information on the subject of bridges and roofs. To the specialist, however, we have no doubt it will prove alike interesting and valuable. It is divided into 11 chapters, and in briefly outlining the field which it covers we can perhaps not do better than supply the various chapter headings. Thus Chapter I is devoted to "Pressures in One Plane;" Chapter II to "Moment of a Force;" Chapter III to "Moments of the External Forces Applied to a Beam or Girder." This chapter is subdivided again into three sections, Section I referring to the semi-beam or girder fixed at one end and free at the other, while Sections II and III treat of horizontal girders, in one case supported only at their ends, and in the other with fixed ends. Chapter IV takes up "Strains in Framed or Built Girders;" Chapter V, "Moments of Resistance of the Internal Forces of a Beam or Girder Having a Continuous Web;" Chapter VI refers to "Deflection, End Moments and Points of Contrary Flexure." This, as well as the preceding chapter and several of those following, is also divided up into sections. Chapter VII enters into the "Strength of Pillars, Columns, Posts or Struts;" Chapter VIII, "Proportions and Weights of Bridge Members;" Chapter IX, "Open Girders with Equal and Parallel Straight Chords;" Chapters X and XI finally give calculations of the weight of bridges of various types and the best number of panels and hights of girders.

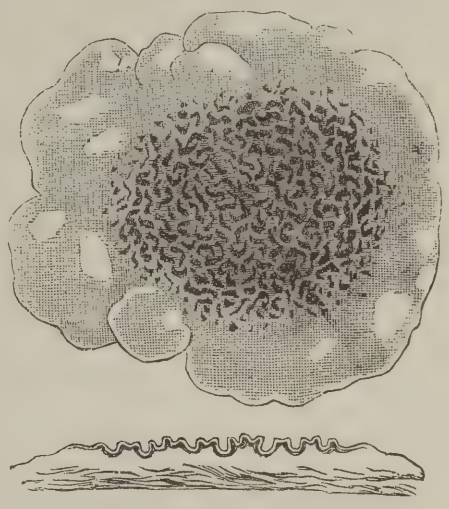
Struts and Ties.

Sir J. Robison gives some good advice to carpenters, with reference to struts and ties. He says: "It depends entirely on the position of the pieces in respect of their points of ultimate support, and of the direction of the external force which produces the strains, whether any particular piece is in a state of extension or of compression. The knowledge of this circumstance may greatly influence us in the choice of the construction. In many cases we may substitute slender iron rods for massive beams, when the piece is to act the part of a tie. But we must not invert this disposition; for when a piece of timber acts as a strut, and is in a state of compression, it is next to certain that it is not equally compressible on its opposite sides through the whole length of the piece, and that the compressing force on the abutting joint is not acting in the most equable manner all over the joint. A very trifling inequality in either of these circumstances (especially in the first) will compress the beam more on one side than on the other. This cannot be without the beams bending and becoming concave on that side on which it is most compressed. When this happens the frame is in danger of being crushed and soon going to ruin. It is, therefore, indispensably necessary to make use of beams in all cases where struts are required of considerable length, rather than of metal rods of slender dimensions, unless in situations where we can effectually prevent their bending, as in trussing a girder internally, where a cast-iron strut may be firmly cased in it, so as not to bend in the smallest degree. In cases where the pressures are enormous, as in the very oblique struts of a center or arch frame, we must be particularly cautious to do nothing that can facilitate the compression of either side. No mortises should be cut near to one side; no lateral pressures, even the slightest, should be allowed to touch it. We have seen a pillar of fir 12 inches long and 1 inch in section, when loaded with three tons, snap in an instant when pressed on one side by 16 pounds; while another bore 4½ tons without hurt, because it was inclosed (loosely) in a stout pipe of iron."

Dry-Rot Fungus.

One of the forms of decay of timber that builders have to contend with is commonly designated by the term dry-rot. As many of our readers know, this is of the nature of a fungus growth. Accordingly some general particulars concerning its characteristics are likely to be of interest. In a recent article in an English paper called the *Gardener's Chronicle*, we find the accompanying illustrations, and also the following article:

The dry-rot fungus is one of the most widespread and destructive of all fungi. It is especially common and well known on the squared timber of ill-ventilated buildings, and from dressed wood it will quickly spread to walls, whether built of stone, brick, or concrete. It will often grow through the mortar of a thick wall, and perfect itself on the bricks both outside and inside. We have seen it growing on damp concrete between the girders of iron fire-proof floors, and seen it spread from wood on to plate-glass, and perfect itself on the latter substance while drawing its nourishment from the wood. In wine-cellars it will spread from the woodwork and walls to the bins and even to the corks of wine-bottles. The mycelium of the fungus will luxuriate between the cork and the neck of the bottle; a slight attack of this sort is said to make the wine "corky." The dry-rot fungus prefers the squared unpolished wood of coniferous trees as a substratum on which to luxuriate, but we have seen it on polished mahogany, and it will spread from other woods to teak, and destroy teak-built ships. It is not uncommon on the fallen timber of pine woods, but, like some other plants, it has long been peculiarly associated with man and his dwellings. It destroys churches, houses, ships, bridges,



Dry Rot Fungus.—Fig. 1.—View and Section of Part of Fungus, Natural Size.

railway sleepers, telegraph poles and many other objects. It must not be assumed, however, that the true dry-rot fungus is the sole depredator. There are 12 British species of *Merulius*, inclusive of *M. lachrymans*, and several of these appear at times in our houses. We have seen *M. corium* almost as destructive as *M. lachrymans*. In addition to the dry-rot fungi, it is by no means uncommon to find buildings destroyed by different species of polyporus, lentinus and other fungi. *Merulius* was so named by Fries on account of the shallow pores or wrinkles of the spore-producing surface, and *lachrymans* on account of the drops of moisture, like tears, which stud the fruiting surface of the fungus when growing in full vigor.

The upper part of the accompanying illustration shows a small plant of a dry-rot fungus; the circumference is white or livid in color, and thick and fleshy. The whole plant is fleshy, and almost meaty when cut. The odor is very strong and mushroom-like. The livid rim consists of transparent interwoven fungus tubes and cells, as illustrated enlarged 400 diameters at Fig. 3; tubes of this nature and size also form the entire base of the fungus. The fungus cells or tubes break down the substance of the wood upon which they grow and transport the juices of the

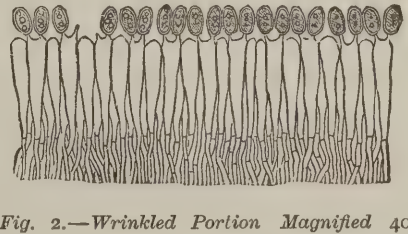
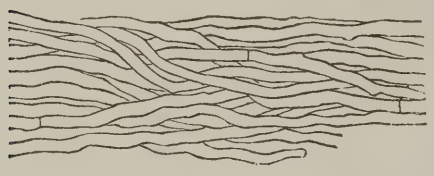


Fig. 2.—Wrinkled Portion Magnified 400 Diameters.

wood to the fungus for nourishment. The central part of the surface of the *merulius* is rich reddish brown in color and indented with coarse shallow pores or wrinkles, as illustrated in the upper figure. A reddish livid juice is exuded from all parts of this fungus; this juice stains every object with which it comes in contact. A section of the wrinkled surface is shown natural size at Fig. 1. Every part of the reddish wrinkled surface produces spores. The same portion distills drops of moisture chiefly derived from the wood upon which the fungus grows. By breaking down the substance of the wood and extracting its juices the timber is ultimately left in a state little better than dry sawdust or powder;

hence the popular name of "dry-rot," a curious name for a naturally wet or "weeping" fungus. If a very small fragment is cut from the wrinkled surface of an example of *Merulius lachrymans*, and a very thin transparent slice is then removed from the exposed surface and examined with a microscope, it will be seen, if enlarged 400 diameters, as at Fig. 2. The coarse transparent tubes of the base of the fungus become much narrower as they gradually grow up toward the brown wrinkled surface, and in the latter position they support tall colorless cells or bladders as shown; each tall bladder throws out four minute horns or spore supporters at its apex, and on each horn an oval spore of rich brown color is borne, as illustrated.

When the ripe spores fall from their supports on to damp wood in close confined air they germinate and throw out fine mycelial tubes, the tubes penetrate the sweating wood and soon produce a perfect dry-rot fungus by drawing from the wood the material necessary for the life and well-being of the fungus. The fungus continues to grow till the supporting timber is completely exhausted and reduced to tinder or dust; the fungus itself now perishes, but not before it has produced myriads of spores which have probably been carried away by currents of air to destroy other damp wood or wood in damp places. The dry-rot fungus will under favorable conditions attain a very large size; its dimensions appear, in fact, to be only limited by the size of the object or material on which it grows; we have seen huge thick growths, like large pancakes, 1 yard or more in diameter. As the growth of the fungus is as rapid as it is exhaustive, it follows that when dry-rot once gets a footing in an ill-ventilated



Dry-Rot Fungus.— Fig. 3.— Interwoven Tubes Forming Fleshy Portion Magnified 400 Diameters.

building the work of destruction is rapid and complete. Floors rot, roofs fall, galleries collapse and window sashes turn to powder and drop out. As the air of the infested building is full of dry-rot spores it is useless to replace old wood with new, for new wood merely supplies fresh food for the fungus. Sometimes improved ventilation is beneficial, but it is impossible to really cure dry-rot, and almost if not quite impossible to stop its progress when once well started, as the fungus is always ready to invade various other materials in addition to wood. To keep well clear of dry-rot its attacks should be prevented.

In a recent issue of our English contemporary, the *Building News*, we find the following consideration of the subject of dry-rot, with more particular attention to the fungus growth which characterizes this form of timber destruction. It is interesting, inasmuch as it summarizes the results of investigations conducted by various scientists in different parts of the world:

One of the most serious evils to which our dwellings are exposed is an invasion of dry-rot or the attack of the timber by the fungoid growth of the *Merulius lachrymans*, This evil, although in certain districts it has assumed considerable proportions, has, so far as we are concerned in this country, fallen far short of the ravages which have been occasioned by this growth in some parts of Germany. The subject has naturally received the attention of scientific men, and great additions have lately been made to the available sources of information concerning the natural history of this fungus. One of the most curious facts with respect to it is that it has never been found on living trees, nor has it been traced on dead or decayed wood in the forests themselves. It is entirely a product of modern civilization, and, from careful observations on its habitat and growth, Professor Poleck has concluded that it could scarcely exist in the forests of Northern Europe. It is very susceptible to the influences of heat and cold, and it requires, in order to flourish, to be kept in almost complete darkness. Hitherto it has been found impossible to cultivate this fungus from its spores, though we are bound to conclude that it is by this means that it is frequently introduced into our houses, either on the feet or clothes of the workmen, or possibly on the tools and plant of the builder, though it may be due in some cases, of course, to the employment of infected timber. The spores are so extremely minute that it is difficult to convey any adequate idea of their size; suffice it to say that some 65,000,000 of them could be stowed away in the thousandth of a cubic inch. The fungus consists of bundles of fine, white, threadlike filaments, which radiate from certain fixed centers or spore-beds, and not only spread themselves over the surface of all the woodwork, but enter into the recesses of the cells and assimilate their contents. These filaments, termed the "mycellum," when seen under the microscope, are found to consist of chains of cells, resembling in many respects the growth of the common mildew, but differing therefrom in the development of side branchlets from certain of the joints. The mycelium of the dry-rot has a marvellous power of conveying moisture to a distance, and it is in this way that this growth is able to extend itself over dry timber, as any available moisture in the pugging or in the walls can be conducted by the inside spreading areas of the fungus to the joists and floor boarding, and in some cases from lath to lath across the plaster in partitions. The actual destruction of the wood can only take place when the fungus is in contact with it, as it can only lay hold on the mineral matter of the cell walls to which it is attached, and cannot extract the inorganic substances, the salts of lime, potash and ammonia, which form its food, from any distance. By the action of the merulius the albuminous substances found in the wood are entirely destroyed, and the timber shrinks into a species of touchwood. Owing to this shrinkage the infected wood shrivels up and cracks up into small cubical fragments and loses all its cohesive strength and elasticity. Such is the avidity of the fungus for the substances on which it preys that when the food stuff in the wood is exhausted it will attack the decaying protaplasm of former growths of mycellium, so that in timber which has been long exposed to dry-rot scarcely any traces of the fungus remain.

Observers in Germany have found that certain kinds of timber are more liable to dry rot than others, and, in consequence of some experiments and analyses of the ashes of timber felled at different seasons, Professor Poleck stated that summer-felled timber is more readily destroyed than that felled in the winter, the ashes of the former being five times as rich in potash and eight times as rich in phosphoric acid as the latter. It has subsequently been ascertained that the above remarks really apply to the difference between wood that has long been immersed in water and timber which has not been so treated. Water slowly dissolves out the salts and the albumen, and thus deprives the timber of those substances required by the fungus, and it is asserted that in Alsace, where this fact is well known, it is usual to specify that only raft timber shall be employed in buildings. Professor Hartig had previously demonstrated that Poleck was in error in his theory about the influence of the time of felling on the durability of fir timber, as in reality there is very little difference in the quantity of salts of potash at the different seasons. Professor Hartig carried out a large number of carefully devised experiments to test the mode of growth of dry-rot and to ascertain the conditions most favorable to its development. For this purpose small samples of sound and infected wood were placed in glass vessels, alone and in contact with different substances and various kinds of soils, such as sand, ashes, coaldust, garden mould and the sifted *débris* from old buildings, and these samples were inclosed in a specially constructed cellar for about five months. At the expiration of this time they were carefully weighed and examined, and the loss in weight and bulk of each specimen was noted. Fir and pine timber behaved alike under these conditions, and lost an equal amount of weight both in the case of winter and summer felled timber. When dry samples, however, were contrasted with moist ones, the loss in weight of the latter was relatively much greater; thus, while the dry wood lost 11 per cent. in weight, the wet wood lost 23.1 per cent.; in pine timber the losses were less marked. In fir the heart timber was more speedily attacked than the outside layers, while exactly the reverse was the case with pine. The experiments undertaken to test the influence of various substances on the growth of the merulius gave somewhat unexpected results, as sand was found to encourage the growth more than a mixture of sand and broken plaster, and dry rubbish prevented the growth of the fungus more effectually than coal dust.

From the facts thus ascertained we learn that nothing can more surely combat the growth of dry-rot than absence of moisture and perfect ventilation. It can only flourish in a damp, stagnant atmosphere, and it can best be checked by banishing these conditions. We fear the practice of pugging and filling in between joists and partitions with damp sawdust and even spent tan has in many instances led to an outbreak of this disease in the woodwork, and dry-rot is often found in perfectly new houses. When once its presence has been detected the most drastic measures must be taken to eradicate it, and here it is well to remember that none of the much vaunted preservatives can avail. The only plan is to remove thoroughly all damp or moisture-loving substances and to scrape away completely, or even renew, all infected timber; bearing in mind the extreme minuteness of the spores, which float in the air and penetrate every crevice, we must thoroughly examine all the timber, no matter how carefully it may be built in, covered up or protected. The plan of building in the ends of wooden beams into the brickwork very often exposes them to the attacks of dry-rot if space be not left for air circulation and ventilation. We must in all cases provide air-inlets and air-bricks under the floors, and the ground beneath the house must be thoroughly drained and rendered as dry as possible. Nearly all the different preservative solutions have been carefully tested in Germany, and oil of creosote appears to have given the best results; but we are warned against putting our confidence in any of the remedies which have been advocated, as they are all liable to failure.

Any one who has been in a house or a room in which dry-rot has made its appearance cannot fail to have noticed the peculiar, disagreeable moldy smell caused by this fungus, and German medical men have attributed certain febrile disorders to the presence of dry-rot. It would seem, however, that proof positive of this fact is wanting; this fungus can only flourish under insalubrious conditions, which may in themselves occasion the above symptoms; and so far it has been impossible to connect the fever directly with the fungoid growth in the timber. From our own observations we incline to think that floorcloth and the various compounds of oxydized linseed oil made into floor coverings have a tendency to promote dry rot, though their action may be due merely to their imperviousness to air and light. We noticed recently a curious example of an outbreak of dry-rot in a matchboarded partition constructed at the rooms of the Birkbeck Institute in Chancery lane. In order to check the sound passing from one room to another spent tan had been filled in between the studs, and large patches of the boarding had become so completely decayed in the course of a few months that a knife could be pushed through the wood as though it were pith or touchwood. In another instance, in which a number of empty cases had been stored on a brick floor, in a damp and dark outbuilding, the fungus had grown over the wood-work in a most remarkable way, and had speedily destroyed the bottoms of all the boxes.

NOVELTIES.

The Horseshoe Spring-Lock Shingle.

A new organization is the Thorn Shingle and Ornament Company, and there has been transferred to it the shingle business

Novelties.—Fig. 1.—The Horseshoe Spring-Lock Shingle.

heretofore conducted by J. S. Thorn. The office of the new company is on the corner of Twelfth and Callowhill streets, Philadelphia. We present herewith a cut of the new shingle which the company have just put upon the market, also an enlarged sectional view through the side locks, and a diagram showing the method of combination in laying the

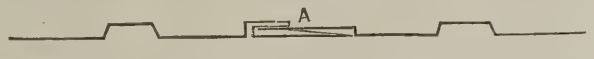


Fig. 2.—Section through Portions of Two Shingles, Showing Features of the Spring-Lock.

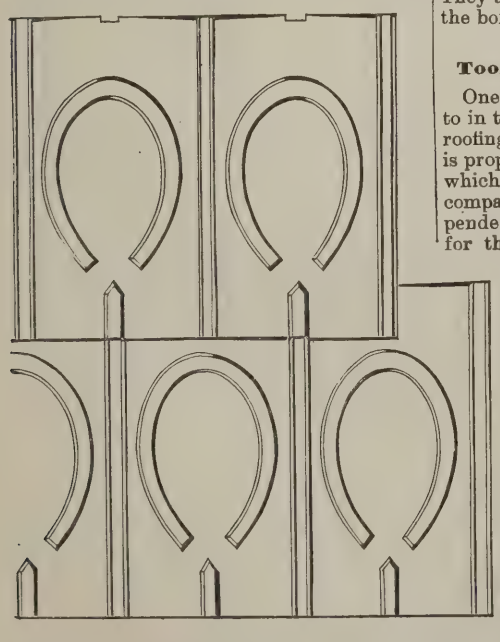
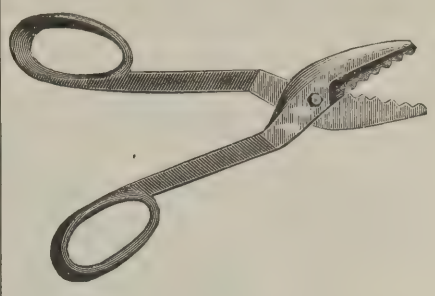


Fig. 3.—Portion of Roof Covered with the Horseshoe Spring-Lock Shingle, Indicating Method of Laying.

shingles upon a roof. The name "Horse-Shoe" is derived from the embossed figure in the center of the plate. "Spring Lock" is intended to indicate in some measure the nature of the side lock between adjacent shingles. Altogether the company have hit upon a name which is distinctive in the description of roofing specialities, and one that is likely to impress itself upon the mind. Referring to the nature of the side lock, which is one of the leading features of the new shingle, Fig. 2 shows a section through portions of adjacent shingles. It will be seen that the shingle to the left is formed up in a way to constitute a cap over the edge of the abutting shingle on the right. At the same time the protruding flange of the shingle on the left is bent back over itself, and comes underneath the projection of the first shingle indicated by A. In laying the shingles the sides are nailed through the double flange of the first shingle described, and as indicated in the nail holes in Fig. 1. The adjacent shingle at the right is then slipped under the first, the return flange of the latter serving to hold the entering edge of the former against the cap. This is shown diagramatically in Fig. 2, but will perhaps be better understood by reference to the sections shown at the bottom in Fig. 1. Fig. 3 of the engravings shows a portion of a roof covered with the new shingle. Concerning the method of laying this shingle, the following directions are given in the company's new circular: Commence at the lower left-hand corner of the roof, turning down the cap on the left edge of the shingle and nailing it to the sheeting. Then fasten the shingle by nailing through the double flange on the other side of the shingle. Pass the edge of the cap of the second shingle over the spring and into the recess and nail it through the double flange of the opposite side. Proceed in this way throughout the entire length of the course. The second course is applied so as to break joints with the one below, beginning at the left with a half shingle. We learn from the company's circular that the shingle here illustrated was invented by George Patten, of Clarksville, Tenn., already well known to the trade as the inventor of the Patten Tin Shingle. The Thorn Shingle and Ornament Company have secured the sole manufacturing right to this specialty. The goods are being put upon the market in various sizes, made from the best quality tin plate, and furnished either painted or unpainted, as may be required. They are packed for shipment one square to the box.

Tools for Cutting Corrugated Iron.

One of the important things to be attended to in the manufacture of such specialties as roofing and siding is to see that the material is properly put in place upon the building for which it is intended. Most of the roofing companies by their system of trade are dependent upon the skill of local mechanics for the laying of their material. Accordingly, it becomes of the utmost importance that every facility should be supplied to these men for putting the work in position in the best manner, and that instructions should be given them how to proceed under varying circumstances. Probably no company have given more attention to this than the Sagendorph Roofing and Corrugating Company, of Cincinnati. The accompanying illustrations represent some of the special tools which they have devised for the purpose of facilitating the laying of their roofing. Figs. 4 to 7 inclusive represent peculiar forms of snips adapted for cutting the material which they supply. Fig. 4 shows a pair of snips for cutting corrugated iron ⅜ inch between centers. Fig. 5 shows a similar tool adapted for cutting iron the corrugations of which are 1¼ inches between centers. The succeeding illustration shows snips for cutting iron the corrugations of which are 2½ inches between centers. Much care has been given to the production of these tools. The principle upon which they are constructed will be seen by even a slight examination of the illustrations. The serrations in the blades are



Special Roofing Tools.—Fig. 4.—Snips for Cutting ⅜-Inch Corrugated Iron.

made to correspond with the form of the iron to be cut, so that in the act of cutting the iron is not drawn out of shape. Fig. 7 represents a similar tool adapted for

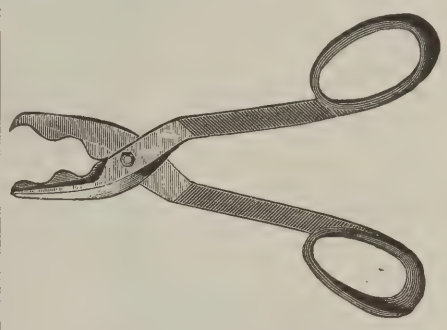


Fig. 5.—Snips for Cutting 1¼-Inch Corrugated Iron.

cutting the sheet iron clapboard which this company is manufacturing. It is constructed upon the same principle as the corrugated snips, already referred to. By the

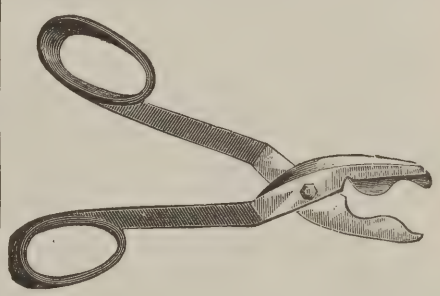


Fig. 6.—Snips for Cutting 2½-Inch Corrugations.

use of this tool, in combination with a pair of plain snips with straight edges, it is possible to trim a corrugated iron and clapboards almost as readily as plain iron can be trimmed. The advantages to the mechanic are of considerable importance, and the tools are of a character to be welcomed by a large class interested in the sheet metal industry.

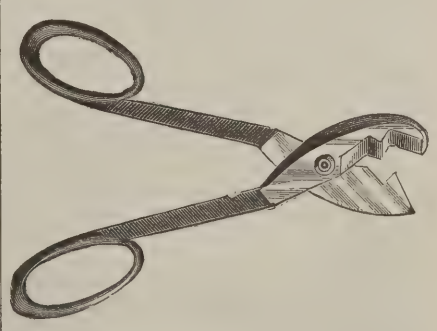
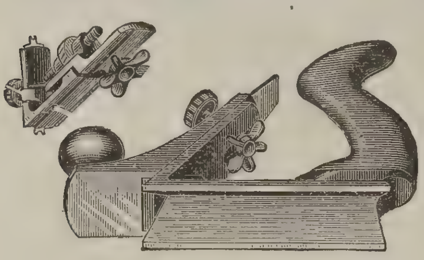


Fig. 7.—Snips Adapted for Cutting Sheet-Iron Clapboards.

The system pursued by the Sagendorph Iron Roofing and Corrugating Company with reference to tools, instructions to agents, &c., is very complete, and affords local mechanics who handle their material every possible facility for putting it in position in the best manner.

New Tools for Carpenters.

The Stanley Rule and Level Company, No. 29 Chambers street, New York, with factories at New Britain, Conn., seem never



Novelties.—Fig. 8.—Stanley's Adjustable Chamfer Plane.

to tire of bringing out new goods and new attachments for old tools, thus adapting them more and more to the daily needs of carpenters and other wood-workers. Three tools are illustrated in the annexed cuts, all of which will be recognized as having their own uses

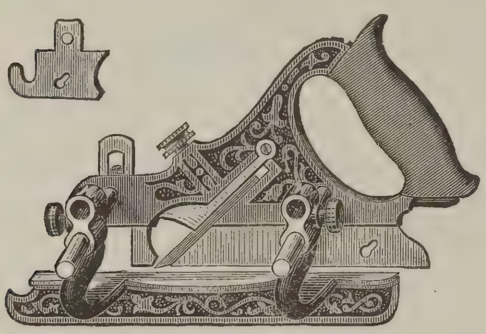


Fig. 9.—Stanley's Bull-Nose Plow and Matching Plane.

for wood-workers and each of which has also special uses when the parts shown with them are properly attached. Referring to Fig. 9, the difficulty of plowing up to and into a hole ½ inch in diameter or larger, as, for example, in sash fitting, stair-work, &c., has been experienced by every wood-worker. This is overcome by the use of the tool referred to. Two interchangeable front parts go with the tools. As here illustrated the form is that of a bull-nose plow. With the other front in place it takes the ordinary form of a plow, and is adapted to all regular uses. With each tool eight plow bits ranging from ⅛ inch up to 5/8 inch are supplied, and also a slitting blade and a tonguing tool ¼ inch wide. The tool shown in Fig. 8 was illustrated in this department in our issue for January of last year. In the interval, however, some important improvements have been made As a simple chamfer plane it has proved itself well adapted to all common uses. An additional section is now supplied to be attached to this plane, movable up and down on the main stock, and by it many special results can be accomplished with the same tool. For example, beading, reeding or molding a chamfer. This sort of work is in extensive demand in carpentry and in furniture making, and accordingly the tool supplies a well-defined want. Six cutters sharpened at both ends accompany this new section, embracing a large variety of ornamental forms. The Universal Hand Beader made by this company, has been heretofore referred to by us. A new attachment has lately been added constituting it a light routing or boxing tool. The special attachment or tool is shown in the small cut, Fig, 10. This cutter, like all others in the assortment which comes with the tool, is sharpened at both ends, one end being ⅛ inch wide and the other ¼ inch wide. It will cut a square groove of either width in any wood, and can be used to smooth the bottoms and sides for grooves which are made by a saw or any other tool. These articles, like all others made by the company, can be bought through any of the hardware houses.

Fig. 10.-Grouting Tool for Stanley's Universal Hand Beader.

Improved Leveling Instrument.

We have on different occasions in the past referred to the leveling instruments manufactured by John W. Harmon, No. 65 Haverhill street, Boston, Mass. Since this article was first put upon the market a number of important improvements have been made, and recently the design and style of the instrument has been changed, and still other desirable features incorporated into it. Two cuts presented herewith, Figs. 11 and 12, illustrate this. Fig. 12 shows the style of instrument ordinarily furnished to builders, as it would be employed in leveling foundations or running lines for any purpose. The tube or telescope is brass, and the central stand, graduated quadrant, and graduated circle at the base of the instrument are of composition metal, finished by nickel-plating. Other parts are annealed iron, finished in japan. The instrument is furnished with a set of composition legs, six inches long. When all set up the instrument stands 13 inches in hight. When increased hight is wanted it can be set on a barrel or box or blocked up in any other way most convenient. When longer legs are desired, as for field work, a socket leg to slip on over the metal leg is supplied. The instrument is furnished in a white wood box with hinged cover. Each instrument is provided with a target, as shown in the illustration referred to, which is 1½ inches high, and is supplied with a screw also 1½ inches long. In use it is blocked up in some such manner as indicated in the engraving.

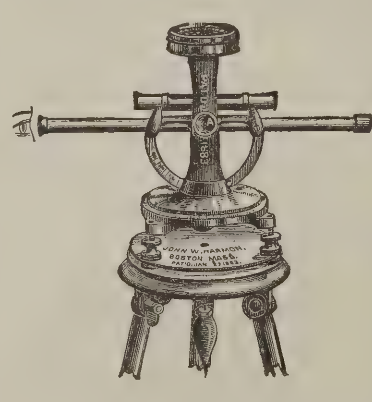


Fig. 11.—Form of Instrument with Compass Attachment.

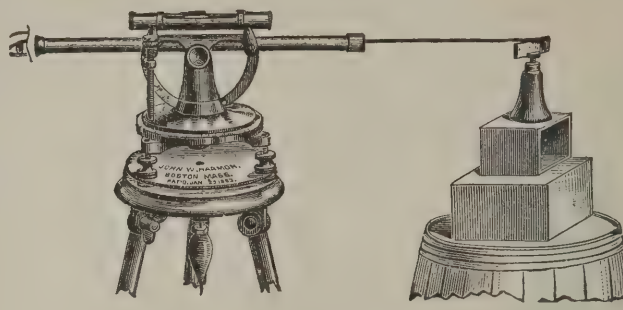


Fig. 12.—Harmon's Improved Leveling Instrument in use for Leveling Foundations.

When an approximate hight has been obtained, the exact level line is secured by adjusting the screw up or down as may be required. In Fig. 11 is shown the same instrument with a compass attached. A descriptive circular has been prepared by the manufacturer in which directions for the use of the instrument are presented, all of which is of interest to builders and others having leveling to do.

Double-Acting Hand-Screw.

Nixon & Co., 62 Dey street, New York, are putting on the market the double-acting hand-screw which is shown in the engraving herewith. The manner in which the thread

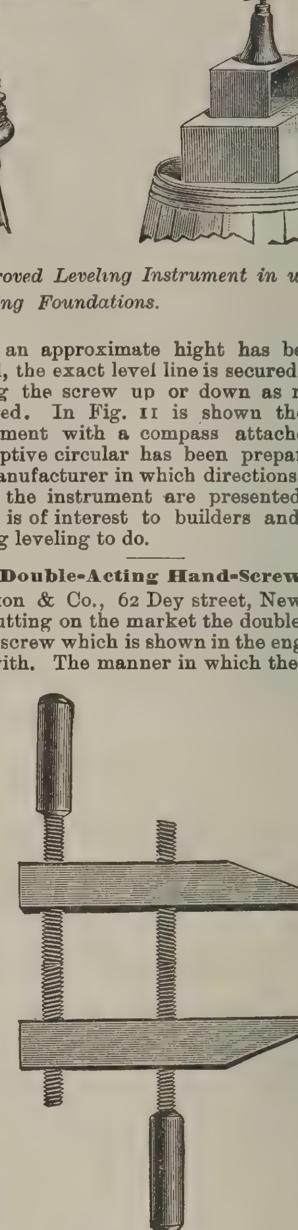


Fig. 13.—Double-Acting Hand-Screw.

is formed, which is indicated in the illustration, Fig. 13, is the special feature of this hand screw, and as the result of this construction the manufacturers call attention to these advantages connected with its use: Its quickness of action; that it has both positive and negative action; that it is always adjusted and in position for use and cannot fall apart. The jaws are made of hard maple or beech, and the spindles of selected hard maple or hickory, as preferred. This hand-screw is protected by letters patent and is put on the market as a superior article.

Reid's Lightning Brace.

A brace specially designed for light boring and screw driving, operating by means of a spiral-twisted shank, is being manufactured by A. H. Reid, of Philadelphia. It is illustrated in Fig. 14 of the engravings. The cut shows the parts of which the tool is constructed so clearly that very little description is necessary. It is very quick in its work, and as the power is applied on the top it may be used with great force. It is so constructed as to be used either automatically, running the bit back and forth, or to run the bit one way only, as would be

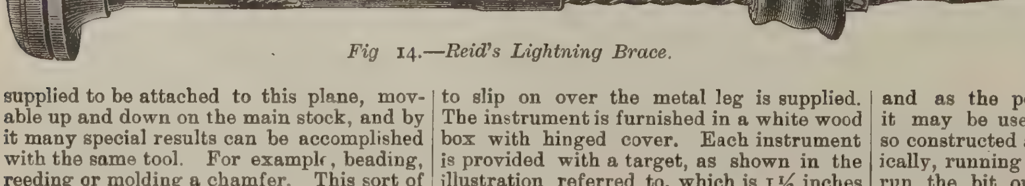
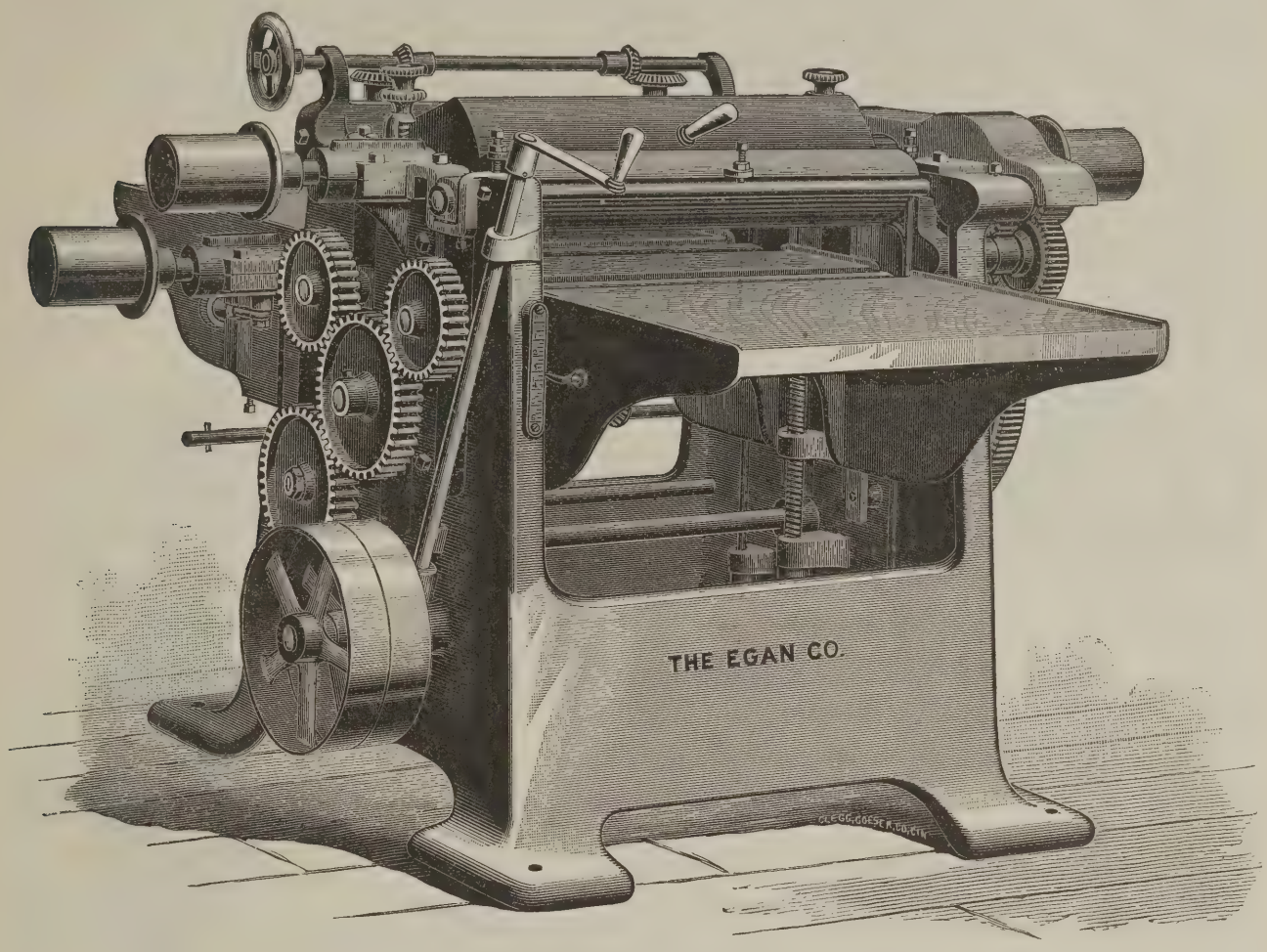


Fig 14.—Reid's Lightning Brace.

necessary in driving a screw or boring a hole with an auger bit. This is done by means of the divided head, which acts as a fast and loose pulley. The maker directs particular attention to the fact that there is no ratchet to get out of order. The tool is double belted, and runs in large, self-oiling journal boxes, lined with Babbitt. The feed consists of four powerful geared feed rolls. There are no expansion links on this machine. The pressure bars are on each side of the knife and come very close up, keeping the bar of small vertical depth, thus facilitating combustion. There is said to be 70 per cent. air space, and this gives it the name to which we have already referred. The maker warrants the bar not to burn off at the ends. By the form employed it will



Novelties.—Fig. 15.—New Double-Surfacing Machine, Built by the Egan Company, Cincinnati, Ohio.

strongly made, and the metal part is finely polished and nickel-plated. The trimmings are of lignum-vitæ and rosewood. Bits are held in place by a spring, and are readily released whenever it is desired to change them. Only one size and style is manufactured.

New Double-Surfacing Machine.

We illustrate in Fig. 15 a new double cylinder surfacing planer, built by the Egan Company, 221 to 241 West Front street, Cincinnati, Ohio. The machine is claimed to embody a number of features presenting important advantages over other designs, and to carriage and furniture factories, planing mills and workers of hard wood in general will prove of interest. The bed is dove-tailed into the frame, and is gibbed in a very superior manner. The lower head is on the bed, and has an independent adjustment. It can be raised and lowered with the bed, or raised and lowered independently by a crank-handle underneath. The outer end of the bed can also be raised and lowered independently to suit the cut being taken, and the part of the bed outside the head can be swung out of the way, giving free access for setting knives. The upper main head is of steel and is enabling the operator to do the smoothest work. The machine will plane 26 inches wide, both sides, and 6 inches thick.

Hooper's Grate Bar.

A form of grate bar that is of interest to managers of wood-working establishments on account of its construction, inasmuch as it is well-adapted for burning shavings, is manufactured by Alexander Traud, East Ferry Street Iron Works, Newark, N. J. It is illustrated in Fig. 16 of the engravings. It is called by the maker the 70 per cent. grate bar, and there is claimed for it that it will last longer than any other bar in the market. It is employed in horizontal, tubular and upright boilers. A circular has been issued describing the bar and contrasting it with other forms in common use, and presenting an interesting chapter on the general subject of combustion. The form of bar and its leading features are so clearly shown in the illustration that brief description only is required. The cut shows the upper face. It will be noticed that in vertical section it is the deepest at the center. Some ribs of corrugated form are carried across it in the center and midway between the center and ends. These tend to stiffen the bar and to give the strength necessary, while still be seen that the air space is uniformly distributed, and by this means uniform combustion is secured. The maker asserts that this bar is without a rival for burning hard or soft coal, culm or screenings, shavings or sawdust, tan bark, &c.

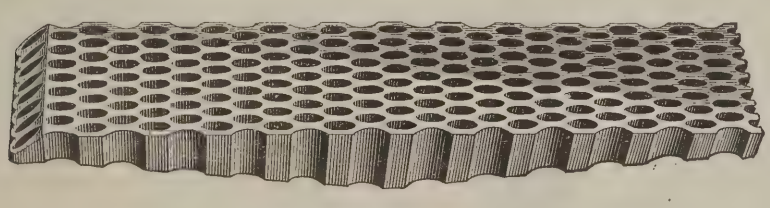


Fig. 16.—Hooper's Grate Bar.

Prescott's Try Square.

Nichols, Bellamy & Co., No. 657 Washington street, Boston, Mass., are putting upon the market an improved try square, an engraving of which is shown in Fig. 17. In its general features this square is identical with the tools in common use. An auxiliary blade, however, extends downward from the regular blade and along the side of the stock. This is notched as shown in the engraving. The auxiliary blade, it is claimed, adds much to the usefulness of the square by holding it in position for ordinary use. It also serves in many cases for laying out miter joists, key seats, parallel lines on half-rounds of cylinders, making wood pulleys &c. With the long blade across the edge of a board, the larger opening will give the angle of 45°; the middle onean angle of 60°, and the smaller one an angle of 67½°. These provide successively the miter cut, the cut for a hexagonal bay window and for octagonal work. Referring to roofing, the larger opening gives the angle of square pitch for rafters, the middle one what is known as Gothic pitch, and the third knife

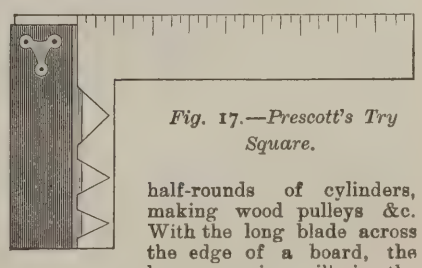
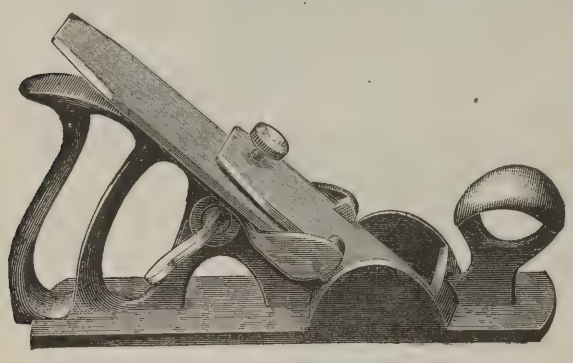


Fig. 17.—Prescott's Try Square.

edge. Among the directions supplied by the makers for the use of this tool, we find the following: "To make a rafter pattern, square the end of the board, and with the stock of the square across the end, get the angle of the lower end of the rafter; then with the stock on the edge of the board, the same opening will give the angle for the upper end." The article is supplied at about the same price as the ordinary tool of the same description, and is handled by the hardware trade.

Mosher's Patent Adjustable Iron Planes.

Among the line of planes made by the Birmingham Plane Mfg. Company, Birmingham, Conn., is the one named above and



Novelties.—Fig. 18.—*Birmingham Plane Mfg. Co.'s Plane.*

illustrated in Fig. 18, which indicates its appearance and some of the special features which characterize it. It will be seen that the bed plate is moved by an eccentric, by means of which accurate adjustment is readily given. The cap which holds the cutter in position takes the place of double cutting plane irons and does away with the slot and upper cover so common in planes already on the market. In setting the cap for a fine or coarse cut the point is made that there is no necessity for removing the iron from the plane, as is usual in other makes, and emphasis is laid on the fact that the adjustment as above referred to is so arranged that the person using the plane can change from a light to a heavy cut or *vice versa* without stopping the motion of the plane on the work. The small number of pieces (six) of which the plane is made indicates the simplicity of its construction. These planes are furnished, we are advised by the company, ground and honed ready for use. They are put on the market with confident claims as to their simplicity and merit.

Alarm Locks.

Some time since we illustrated in this column an alarm bolt applicable to doors, manufactured by the Vassar Burglar Alarm Company, New York City. We now present a device, Fig. 19, manufactured by this company, whose address is at present in the Domestic Building, Broadway and Fourteenth street, New York, which combines in one article a knob latch, dead lock and key lock, and which also has the special features of the burglar alarm to which attention was formerly directed. The ent re fastening of the door is in one ornamental attachment. The burglar alarm is in the nature of an alarm bell, wound up by the thumb key shown in the cut, and tripped by any pressure upon the outside of the door, which brings the bolt into contact with the socket in which it rests. When the alarm is set pressure from the outside or any undue handling of the lock, as, for example, attempting to pick it, has the effect of tripping the alarm and setting the bell going. The alarm is so arranged that upon its being started it rings for one revolution, while the winding is for a number of revolutions. Accordingly, one winding of the alarm puts it in shape to give warning for repeated attempts to get through the door. The simple bolting or locking of the door puts the apparatus into working order. No special preparations are needed. The company has brought out a very large line of locks and bolts embodying this feature, so that trimmings of almost any style of finish are available. A similar alarm is arranged for windows and scuttles, and a very complete catalogue has been prepared, illustrating the goods and explaining their features. Referring more specifically to the illustration, it will be seen that the key used with this lock is of the folding pattern. In the place of a knob on the inside a handle is used. A bolt which is round in form occurs near the top of the look, and is thrown forward on the inside by the finger piece extending below the lock. It is thrown backward or forward at option from the outside by the key. A dead latch is secured by turning one of the small thumbscrews near the top of the cut, while turning the other causes the alarm to ring when even the proper key for the lock is inserted. By this means it is possible to set the alarm so that even the possessors of keys cannot enter without making their presence known. The lock is so arranged and adjusted that it would seem to meet almost every requirement that can be made of it.

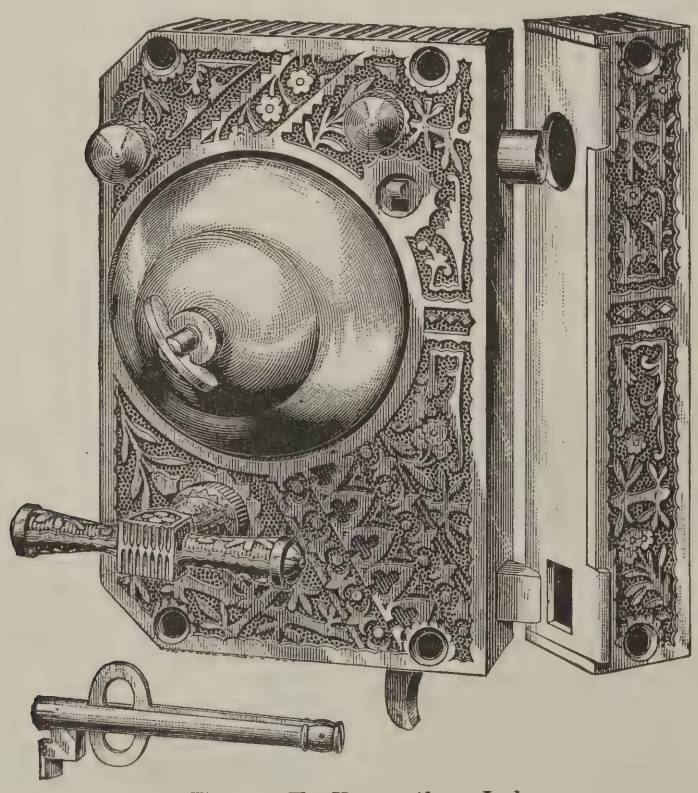


Fig. 19.—*The Vassar Alarm Lock.*

Diamond Mortising Machine.

A new foot-power mortiser has recently been brought out by the Seneca Falls Mfg. Company, Seneca Falls, N. Y. A general view of the machine is presented in Fig. 20

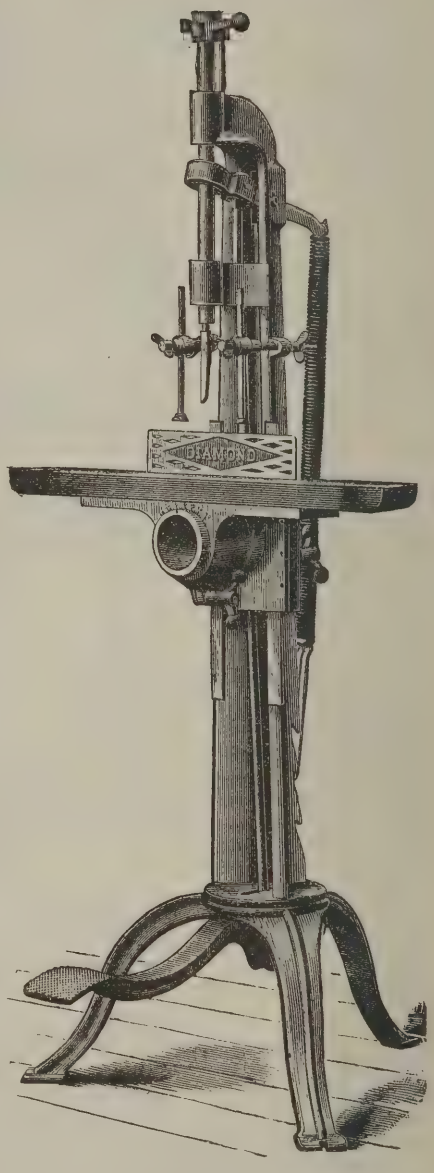
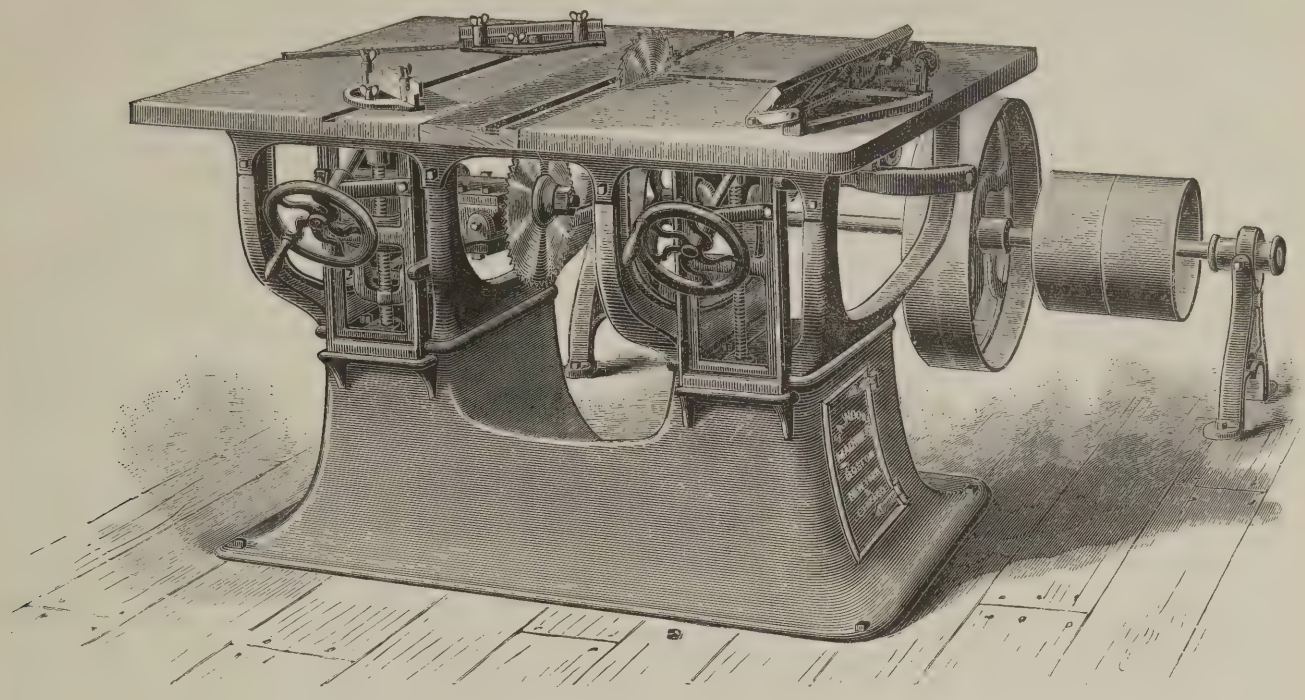


Fig. 20.—*Diamond Mortising Machine.*

of the engravings. The machine is light, weighing only 140 pounds, which permits of its being readily transported or moved from place to place in a shop as may be required. It is for foot-power exclusively, and is claimed by the manufacturers to have many new and valuable features. By the nature of the design, the machine is strong and substantial, and has powerful motion, accurate action and a large range of work. The machine is entirely of iron and steel, except the hard wood strip on the top of the table. The treadle is arranged in such a way as to obtain great leverage and power on the chisel spindle without special strain on the working parts. The table has easy, accurate and positive, horizontal, vertical and angle adjustments. The angle adjustment is a feature that will be appreciated

by mechanics in general. How it is arranged, it will be seen by a glance at the engraving. A graduated scale is provided by which the operator may tilt the table either to the right or left, so as to cut work at any desired angle. The spring is of heavy coiled wire, and is so arranged as to be adjusted for any desired tension. The chisel reverser is attached to the outer end of the chisel spindle and is provided with a stop which secures accuracy in reversing the chisel. Each machine as shipped by the makers is provided with three self-cleaning mortising chisels ⅜, ½ and ⅝ inches in width. Other sizes may be substituted if desired.



Novelties.—Fig. 21.—Double Iron Saw Table.

Double Iron Saw Table.

The S. A. Woods Machine Company, of New York, Boston and Chicago, have recently perfected a double iron saw table which is illustrated in Fig. 21 of the engravings. It carries two saws from 6 to 20 inches in diameter, and the whole weight of the machine is some 1400 pounds. A single casting in pedestal form supports the frame of the machine and secures strength and solidity, rendering it impossible for the working parts to get out of line when the table is being secured to the floor. The arbors are of English steel, heavy and run in self-oiling boxes. They are hung in a heavy-yoked frame. The saw arbor pulley has a 6-inch face and is covered with leather, adding greatly to the belt power. The swinging frames carrying the arbors are raised and lowered by hand wheels which are located at the most convenient angle for the operator. The table top is of iron, accurately planed and fitted with both splitting and cutting-off gauges. We are informed by the company that since the engraving was made, which is used herewith, an improvement in the gauges has been introduced. The splitting gauge is now secured to the front edge of the table and is readily adjusted to any bevel. When removed for cutting off long stock, it leaves the table free from grooves. The cut-off gauges, which are also adjustable, are placed each side of the cut-off saw, thus allowing the stock to be worked or mitered on every side of the saw at any angle. The cut-off gauge at the left of the saw is an extension gauge sliding in a T slot, and can be drawn out sufficiently to support the widest lumber in cutting off. The part between the two saws is of wood. This can readily be removed when desired to use molding or grooving heads, the arbors being of sufficient length to allow this.

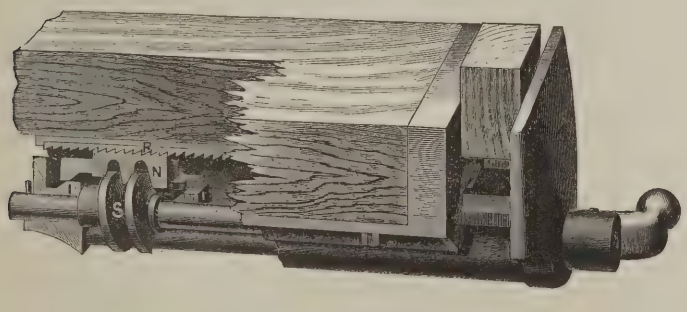


Fig 22.—Wyman & Gordon's Quick Action Vise.

Quick Action Vises.

Wyman & Gordon, the Worcester Drop Forging Works, Worcester, Mass., are manufacturing a quick action vise, the construction of which is represented in Fig. 22. By a reference to this cut the operation of the vise may be explained as follows: Holding the handle up right it is pushed with the movable jaw, up to the work, when less than quarter revolution of the handle turns the screw S, and the rack nut N is forced forward to the inclined plane I, and then upward, and engages with the long ratchet rack R, which is attached to the bench piece; by further turning the handle the jaws are brought together firmly gripping the work. This vise is made with jaws 9 and 14 inches wide, weighing respectively 55 and 65 pounds, both opening 12 inches. It is designed especially for the use of woodworkers, cabinet-makers, pattern makers, &c. Attention is called to the fact that it has a quick and positive screw grip, and the pitch of the screw being slower than in the common screw vise, is alluded to as giving it a stronger grip. Attention is also called to the fact that the working surfaces are large, and being finished, will work smoothly and wear well. Its parts are interchangeable. For cabinet and piano makers' use it is stated that the vises are sold in pairs, a 14 inch front vise with a 9-inch end vise. Further points mentioned in connection with them are the economy of time resulting from their use, that they will never work loose, and are operated by one hand.

The Osgood Ratchet Bit Brace.

Saxton & Osgood, Buffalo, N. Y., are manufacturing a new and recently patented ratchet bit brace, named as above, and described as strong, simple and easily operated. It is shown in Fig. 23. By the device of a single sliding pawl, moving longitudinally and having full bearings at all times on the ratchet-wheel, the ratchet changes, from positive to the right or left and reverse, are instantly made, and all screws, pins, rivets, cams, turning but-

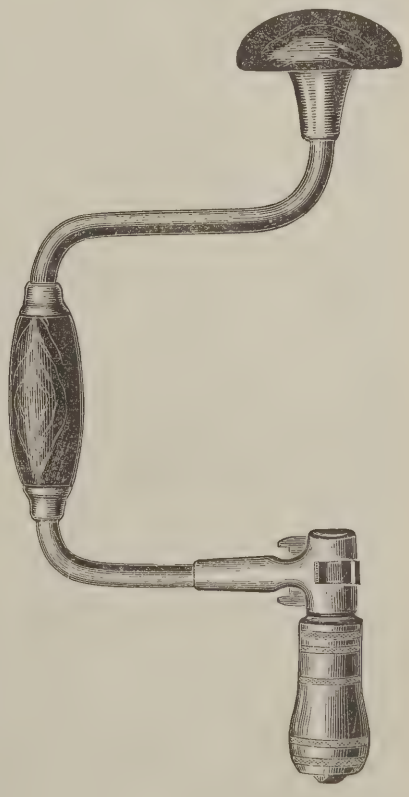


Fig. 23.—The Osgood Ratchet Bit Brace.

tons or sleeves are dispensed with in its construction. The cut represents the ratchet locked for use as an ordinary brace; by simply sliding the pawl up or down, the right and left hand changes are made for use as a corner brace, and the ratchet-wheel is firmly held in all positions. These braces are made in several styles of finish.

TRADE NOTES.

THE TRADE LITERATURE prepared and distributed by William Willer, of Milwaukee, relating to Willer's sliding blind, folding blind, sliding screens, screen doors, &c., is among the most attractive that reaches us. General Catalogue Price List No. 4, and Architects' and Builders' Supplement No. 5, both bearing date of 1887, are just at hand. The illustrations in both books are very clear, the paper is good, and the general arrangement of the matter is in such a shape as to be of the greatest service to those who desire to investigate the line of goods manufactured by this concern. The Architect's and Builders' Supplement shows full-size sections of guide ways, stops and moldings, sections of window frames, and directions for ordering and fitting.

IN THE LAST ISSUE of *Carpentry and Building* the types caused us to present the name of the manufacturer of one of the "Novelties" very differently from what it should be. We refer to the power screw-driving and boring machine, shown on page 19 The maker's name is M. C. Henley, and not Hurley, as it was printed. The machine referred to is meeting with a very flattering reception.

THE SIMONDS MFG. COMPANY, with works at Fitchburg, Mass., and Chicago, Ill., have issued a very handsomely engraved calendar for 1887. The engraving is on steel, in line work, and is from the well-known firm of John A. Lowell & Co., Boston, Mass. The calendar is in the form of monthly sheets, attached to a piece of cardboard about 7 inches long. Above the monthly sheets there appears the card of the company. A cut of the inserted point used in the company's circular saws appears as a part of the caption of the card. Near the center of the card there is a list of the goods manufactured by the company, and there also appears a cut of a circular saw. Altogether the calendar is neatly gotten up, and makes a very attractive appearance.

THE RICHMOND WEATHER STRIP COMPANY, of Richmond, Ind., in summing up their business for 1886, say they had a very prosperous year. No less than 20,000 of their strips for the bottoms of doors were sold, and several hundred thousand feet of their Excelsior rubber stripping for the sides of doors and of windows were sent out.

WE HAVE RECEIVED from the HP Nail Company, of Cleveland, Ohio, a very neat envelope opener and paper cutter. The article is made from one of the large size steel nails which the company manufacture, and is flattened out for about two-thirds of its length in order to secure a good cutting edge. The part above the cutting edge is round, and is serrated for about an inch resembling the conventional wire nail. On the head there is embossed the monogram of the company. The cutter is handsomely nickel plated, and forms a useful addition to desk equipment.

A VERY HANDSOME catalogue of folding gates is being sent out by the Composite Iron Works, of No. 83 Reade street, New York City. Among the illustrations gates are shown in almost every imaginable place in which they can be used, including elevators, ends of bridges, railway crossings, ends of ferry boats, between cars on elevated railways, across platforms of street cars run by the cable system, &c. The title page of the catalogue is a characteristic design, employing the "Brownies" with which Palmer Cox has amused both old and young in some of the magazines for years past. In one of the illustrations the imps have shut out, by means of the folding gate, old Sol, and the face of the orb expresses both surprise and dismay. In the second illustration the gate is being opened, and the face of the sun is radiant at the change. The catalogue is one that should be in the possession of every builder and architect.

A NEW GAS MACHINE has been recently brought out by Knisely & Miller, of Chicago. It is known to the trade as the Chicago Gas Machine, and is claimed to have many merits that are peculiar to it It may be operated either by pressure from a blower or from city gas. Gasoline is used, and the resulting product is said to be very desirable for use, both for illuminating and heating purposes. The machine is automatic in its action and requires a minimum of attention.

THE WARREN EHRET ROOFING COMPANY, Limited, announce their removal from 109 South Second street to 428 Market street, Philadelphia. They inclose us copies of their circulars, one of which recounts the advantages of slag-stone composition roofing over metal and slate roofing.

The Peerless Mfg. Company, of Louisville, Ky., inform us that the growth of their business has compelled them to make a very important addition to their facilities. Their molding department has been increased to the extent of 100 feet, with the prospect of further additions before the end of the year. In order to utilize their Rice Sand Molding Machines they are preparing to go extensively into the manufacturing of grates and fireplace settings for all styles of mantels. Their plant for this kind of business is said to be the most complete of its kind, and comprises everything that is new in machinery and labor-saving appliances. The company will start into the spring trade with patterns and designs that are both new and attractive. This department will be managed by Mr. W. E. Fitch, who has a national reputation in this line of goods. We understand that the company stand ready to send photographs with description of goods upon application.

THE CINCINNATI CORRUGATING COMPANY have issued the following circular: "The Cincinnati Corrugating Company have for many years used as their brand the word 'Superior,' and claim they bend every energy to the maintenance of the verity of their brand. This is done by the closest attention to the minutest details, every sheet of iron being carefully inspected before painting, when even the smallest 'pinhole' compels rejection; by using the most improved machinery, all driven by steam-power; by using none but the best of metallic paint, thoroughly reground in pure linseed oil; by carrying the largest stocks of sheet iron in the United States, thus filling all orders promptly; by furnishing inquirers at once with detailed estimates. They are reliable and abreast with the march of improvement, and only solicit a trial when you are in need of anything in their line."

THE ANNUAL MEETING of the Wholesale Sash, Door and Blind Manufacturers of the Northwest, was held in Chicago on January 19. The only business of importance transacted was the agreement to a slight advance on all lines of goods manufactured by members of the association. Officers for another year were elected, including G. W. Paine, of Oshkosh, president, and O. C. Steenberg, of Fond du Lac, secretary and treasurer. Similar action in reference to prices was taken by the Eastern Sash Door and Blind Association which met at Buffalo, Jan. 25.

IN A RECENT issue we referred to Dr. J. G. Smith's hot-air ventilating furnace grate, which we illustrated. We are now in receipt of circulars showing open stoves embodying the same principle and also manufactured by the same company, namely, the Omega Stove and Grate Company, Cleveland, Ohio. The stoves shown are of an ornamental pattern, not differing in their general features from many of the square stoves in the market. An arrangement of the air flues similar to those employed in the grate is placed above the fire and, taking air from the base of the stove or an out door supply, heats it and throws it into the room near the top. The open doors of the stove fold down in front instead of swinging out, and the stove at pleasure may be used in the form of a grate, or in other words resembling a Franklin stove, or as a close stove. These goods mark a new departure in stove construction.

THE SCOTT & WALKER PAPER COMPANY, 535 Arch street, Philadelphia, invite the trade to send for samples and price list of their building paper for roofing, lining, deafening, &c. Various kinds and qualities are kept in stock.

JOHN A. FISH, managing director of the Gurney Hot Water Heater Company, No. 237 Franklin street Boston, is directing attention to Gurney's hot water heater, which is claimed to possess numerous advantages over other devices. The heater is portable and is quickly set up, requires no brick work, and is noiseless in operation. The fire part is provided with ironstone lining. The grate is adapted for burning either hard or soft coal.

J. H. HOAGUE & CO., of Chicopee, Mass., present in their card this month illustrations of two forms of the Chicopee automatic drill. This tool has proved a great convenience to many mechanics in both wood and iron.

THE CAPACITY of the Empire scroll saw, manufactured by the Seneca Falls Mfg. Company, Seneca Falls, N. Y., is attested by a letter, published in the company's card in another part of this issue, received from a firm of carpenters and contractors who put the machine to a very severe test. The company offer catalogues free to all applicants.

WHEELER'S WOOD FILLER has a national reputation, and yet there are many who have only a theoretical acquaintance with this excellent article. A pamphlet giving particulars concerning the finishing of hard woods has been prepared, with a general description of the filler, by the Bridgeport Wood Finishing Company, of New Milford, Conn., and with New York office, at 96 Maiden Lane. This book is offered to all who are interested in the general subject named.

THE WARREN EHRET ROOFING COMPANY, Limited, No. 428 Market street, Philadelphia, invite the trade to write for this month's special discount on their goods. They direct attention to their roofing as being cheaper than shingles, and more durable than iron.

W. A. HEATH, of Binghampton, N. Y., among other wood-working machinery, is manufacturing Shaper's bead mortisers, pony planers, dowel machines and chair machinery. He invites all in want of machinery of this general character to send for his catalogue.

THE CANTON IRON ROOFING COMPANY, Canton, Ohio, successors to F. C. Snyder & Co., invite the trade to send for catalogue, price list and samples of their roofing specialties. In their card in another part of this issue they refer to the different kinds of iron roofing and siding which they are manufacturing.

THE GLOBE IRON ROOFING COMPANY, Cincinnati, Ohio, have issued a calendar for 1887, the centerpiece of which is the representation of a very interesting, although highly-colored, young lady, whose principal apparel seems to be a green gauze veil, a necklace of pearls and an incipient blush. Her raiment is scarcely what would be required for an outdoor costume the present weather. The calendar is in the shape of small monthly sheets, fastened at the lower left-hand corner of the card. A picture in the middle of the bottom shows a building on which the siding manufactured by this company is being placed, and also the application of their flat or plain roofing. A list of the company's goods and an invitation to send for prices and catalogues are presented in the lower right-hand corner. The center piece, as already mentioned, is highly colored, and the calendar cannot fail to attract the eye wherever it may be hung.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE new Equitable Life Insurance building, now near completion in the lower part of Broadway, is a massive pile of granite occupying an acre of ground, is practically fire-proof, and forms one of the most imposing structures in the city. The grandest of its features is the broad, spacious and noble central court forming a part of the passage-way through the building. It is 100 feet long by 44 feet wide, over which an arched roof of marble and decorated glass is sprung at a hight of 30 feet from the tesselated pavement. The latter is a work of art. The roof of the court is supported by columns of variegated marbles, with capitals and cornice of onyx and Numidian marble. The court is reached from Broadway by a grand entrance 22 feet wide, and a similar hallway extends through to Nassau street, making an unbroken vista of 300 feet from one street to the other. A great number of shops, carefully selected to meet the requirements of the tenants, will line the spacious passage ways on either side. A wide corridor from the Pine street entrance intersects the grand court in the center. In the court will be grouped ten large hydraulic passenger elevators. The elevator shafts are lined with porcelain-faced brick. The arrangements for heat, water supply and other conveniences are on an elaborate scale.

A NOVEL hypothesis has been suggested to account for some of the innumerable fires the origins of which are vaguely assigned to defective flues. According to the theory broached in a Philadelphia paper, while the immediate cause of many fires is defective flues, the primary source of trouble is the distillations from the wood fuel which attack the mortar between the chimney bricks, so that before long a defective flue is the result. This danger naturally prevails more in country than in city houses, for in the latter comparatively little wood is burnt. The wood used for fuel gives off pyroligneous acid during combustion, which corrosive substance carried up the chimney in the form of vapor condenses on the surfaces of the brick and, we are told, attacks the mortar. Next the rain, coming down the chimney, washes out the dissolved or loosened portions of mortar until finally crevices are formed between the bricks through which sparks penetrate and find a resting place in the dry timber adjacent. A fire is thus started which ends with the destruction of the building and the verdict "defective flue" follows. Assuming that there is a germ of truth in the hypothesis that the acids distilled from wood will attack mortar, it is rather hard to believe that this could prove an appreciable source of danger where the walls of a chimney are, as they should be, 8 inches thick. The joints might be corroded and washed away to a depth of a fraction of an inch, but further than that the rain-water would not penetrate, even supposing the acid from the wood was not stopped by the soot and dirt always present in plentiful quantities in the chimney of a country house.

A FEW days since a meeting was held in New York for the purpose of forming an organization among the employers in the building trades. Some 4000 invitations to attend this meeting were circulated, and there were present on the occasion of the meeting about 300 people. Nearly 300 others responded by letter, expressing sympathy with the movement and agreeing to co operate with it. The ostensible scheme of the organization is to form a federation for the purpose of resisting the trade unions. The purpose is to enable builders to discriminate between trades union men and in favor of independent labor whenever they have the opportunity of doing so. The plan of operation proposed is that the employers concerned in the movement shall pledge themselves to give continuous employment to non-union men, and thus assure to them the opportunity to work, of which they are at present deprived. Should this scheme be carried out it will divide the working men of this city into two distinct classes—union men and non-union men—and will have the effect, to a certain extent at least, of arraying one against the other. We merely state these facts without comment, in the sense of recording what is taking place. It must be evident to every thinking person that if the extreme demands of so-called "Labor" were agreed to, or if, in turn, there were no check upon employers, the community at large would suffer. Middle ground, however, must surely exist upon which both can stand, and where force opposed to force will find the neutral point. If happily all this can be reached by agreement, rather than by the exercise of what is too much like brute force to command admiration, it would be well for the community.

WE MENTIONED in these columns some time since the success of a fair or local industrial exposition held in one of the Western towns of the country, which was in its conception and management somewhat outside of the usual rule. The ladies of the town desired to raise a fund for a certain purpose, and were fortunate enough to enlist the co operation of both the churches and manufacturing establishments in their enterpsise. The churches contributed the social element, while the manufacturing concerns put in exhibits of their machinery and other products, forming a combination that was at once novel and successful. It would seem that the citizens of Pawtucket, R I., have emulated the example of their Western brethren in a similar enterprise. They organized some time since what was called "The Bazar of Nations," under the auspices of the Ladies' Soldier Memorial Association. Music Hall, in that city, was secured for the purpose, and was specially fitted up for the occasion and handsomely decorated. We have not space to enumerate the various exhibits, but from the accounts which have reached us we are safe in comparing it to some of the great fairs which were held during the War of the Rebellion in aid of the Union cause, and looking to the amelioration of the condition of the wounded and sick in the hospitals. In the Pawtucket exposition there were upward of 80 exhibits by the manufacturers of Pawtucket and the immediate vicinity, to say nothing of crazy quilts and samplers, and various art treasures, &c., contributed by the ladies. The immediate management of the exposition was intrusted to Capt. Henry F. Jenks, who discharged his responsibility well.

AT THE late meeting of the American Public Health Association, held at Toronto, Dr. George Baird, of Wheeling, W. Va., read a paper on "Sanitation in Street Paving," in which the different styles of paving were discussed with special reference to their bearing on the health of the community. The pavements in ordinary use are criticised as follows: "The macadam road, the cobble pavement, the wood pavement in its various forms and the granite pavement have all been found more or less objectionable from a sanitary standpoint. The macadam, with its rapidly worn surface and its clouds of dust, carrying disease germs in them; the cobble pavement, with its noise and innumerable pockets, furnishing lodging places for decaying animal and vegetable matter; the wooden pavement, decaying in a few years and absorbing urine of horses and foul liquids of all kinds which were poured on its surface, and the granite, with its noise far exceeding the cobble, its slippery surface when worn, and its open crevices between the blocks, permitting liquids of all kinds to pass down and pollute the street surface beneath, are each and all of them subject to adverse criticism."

DOCTOR BAIRD next gives a description of a pavement that has been successfully used in Wheeling, and which is claimed to be free from the objections above enumerated. The material he favors is a vitrified paving block in the shape of an oblong truncated wedge 9 inches long, 4¾ inches wide, $3\frac{1}{16}$ inches on one edge and $2\frac{13}{16}$ inches on the other. It is composed of fire-clay, iron ore and silica fused to a homogeneous mass. The blocks are laid in 3 or more inches of sand, the broad and narrow edges turned upward in alternate rows, and the joints broken. The spaces between the blocks are brushed full of finely screened gravel and paving cement poured on this until they are made completely water-tight. Over the surface of the pavement pitch is poured, and a layer of sand ½ inch thick is spread. The roller is then passed over the pavement until all the blocks are firmly settled in their places and the entire surface forms a continuous uniform plane. The cost of this pavement is stated to be less than cobble, wood, asphalt or granite, and, besides being water-tight, will last an indefinite time provided the coating of sand and pitch be renewed when necessary. Other things being equal, the pavement which will prevent the filth of the street from soaking into the

ground below is to be preferred, for a contaminated soil is well known to be a fruitful source of disease. One point which Dr. Baird does not appear to have duly considered is the tearing up to which the streets of certain cities are constantly subjected. His vitrified block pavement would undoubtedly be water-tight and durable if left undisturbed, but in a city like New York, where the roadbeds are hardly left to lie in peace for more than a month at a time, owing to the frequent unearthing of the pipes and conduits beneath, the conditions are most unfavorable, and no pavement could well be kept either smooth or water-tight.

AN ENGLISH journal enumerates the following as among the inventions which are specially needed at the present time: Macaroni machinery, good red-lead pencils, type-writers that will work on account books and record books, indelible stamp cancelling ink, a practical car starter, a good railway-car ventilator, better horse shoes, locomotive headlights, an instrument for measuring the velocity of wind currents, apparatus for measuring the depth of the sea without sounding by line, piano-lid hinge which shall be flush on the outside, good fluid India ink for draftsmen, a good metallic railway tie, an effective cut-off for locomotives, a method of alloying copper and iron, and a molding material for iron and brass casting capable of giving a mold that can be used over and over again.

THERE is an old proverb that truth lies at the bottom of a well. Judging from other articles which are sometimes found at the bottom of wells, we should suppose that truth was occasionally in very bad company. The following is a list of articles from a well in Georgia a short time since, when it was cleaned for the first time in several years: "Two live crawfish, perfectly white and without eyes, three pocket-knives, three pipes and pipestems, one cannon ball, dippers, hairpins, one brass breast-pin, one hoopskirt, two bucket-lids, piece of hand saw, old shoes, old pieces of plows, two bucket bails, one snuff box, one lot of irons, part of a buggy, wagon band, clevis irons, pieces of plank, tin cups, pieces of chair, glass, old bottles, window sash, leather, brass pins, wire, rocks, bricks, chains, hoes, whip handles, broom handle, old wool hat, large iron bucket, small iron bucket, iron rims, pieces of key, spikes, iron bolts, nails, taps, heel pins, screws, sardine box, light-wood torch, bed roller, canes, pistol shell, iron ring, iron quoit, pieces of earthenware plate, gin box, cloth, acorns, mud."

THE court fool, who in spite of his cap and bells was often a very long-headed person, has in these days been superseded in some measure by the comic newspapers, which by the aid of joke and caricature frequently enforce most useful lessons. Our contemporary, *Puck*, realizing the fact that the school system of the present is not all that might be desired, has used pen and pencil to good effect in showing up some of its evil features. A series of pictures in a late number gives a graphic presentation of the subject, while the article accompanying appeals to the reason, and together they constitute a strong indictment against the established order of education. The text-book system and the marking system are referred to as the two systems that are the curse of American schools, public and private, their effect being the overstraining of young bodies and the dulling of young brains. The teachers, on the other hand, by them are saved considerable brain work and labor, thus enabling a large class of worthy but ignorant people to get a living with reasonable ease and certainty. Many a man, it is said, who would otherwise be seeking vainly a position as assistant entry clerk or light porter is to day getting a respectable salary as an instructor of the young—a position to which he could never aspire were it not for the text-book system. Our contemporary next reviews the evolution of the standard text-book, and describes its application to teaching: "A publisher's hack writes a text-book, an English grammar, or a so-called history of the United States or the world, or a first book in natural history. Whatever he may call it, it is nothing better than a spiritless transcript of dull generalities and dry technical or statistical facts, culled, often with little attempt at accuracy, from such standard authorities as may be accessible to him. Then another hack, who calls himself a teacher, hands this book to the children given into his care, and tells them to learn so many lines or so many pages a day. He does not teach them; he merely tells them to learn. When the time for recitation comes, each child repeats all or a part of what he has committed to memory, while the hack compares the recitation with the printed page. If the recital and the text book agree, the child gets a credit of such and such a figure in a record book. If there are discrepancies, the child gets a smaller figure. If the two do not agree at all, the child is marked naught or zero. At the end of the week the hack adds up the little child's figures, divides the total by the number of the recitations, and gives the result—say 778.33—as John's or Eliza's 'average of scholarship.' This is written in a printed form, and sent to the child's parents, to be signed and returned. It will seen that there is no undue strain upon the teacher's brain. It would be more difficult to measure tape and make change in a dry-goods shop."

THE effect of all this upon the children is useless, if not absolutely harmful; their brains are stuffed full of facts, while their faculties of reason and observation are left untrained and unstrengthened, and furthermore, as *Puck* says, the child has not learned to learn. "The text-book-taught boy can 'bound' the States of the Union, can repeat the names of the Presidents in proper order, and can tell you when each monarch of England came to the throne. But what does he really know of the history, character and resources of his own country? What does he understand of the lesson of England's growth and the grandeur of her past? And how has he been taught to find out for himself? * * * * History is for him a matter of dates; geography a matter of statistics." But the text-book system is put under yet severer condemnation because of a disgraceful kind of understanding between publishers and teachers; the former print the new and revised editions, in which the principal alteration consists of a new date on the title page, and the teachers, it is intimated, buy them, perhaps at a discount, and distribute them to the scholars on the receipt of full price. Assuming such a plan of action to exist, it is little wonder that text-books have to be replaced at frequent intervals. Speaking of the possible existence of some such system of bribery, *Puck* says: "On no other ground can be explained the feverish anxiety shown in many schools to pile study upon study; to load down weak, half-grown children with books upon books; to exact tasks—always under this text-book system—which wear out young bodies and young brains, and bring our children to a premature, one-sided development of the mental faculties, at the expense of strained and enfeebled frames." The only fault we have to find with such criticisms is that it allows of no exceptions among the teachers, but apparently qualifies them altogether. Instances are undoubtedly frequent of ignorant and dishonest school teachers, but, notwithstanding the disadvantageous text-book system under which they labor, there are many teachers who are able and conscientious workers. Besides the more noticeable faults about text-books and their manner of use, there is another point deserving attention, which is the false impression which they often give of persons and events. This is especially true of primary books, in which anecdote and illustration are made frequent use of. It is these very illustrations and anecdotes which make the deepest impression upon the child's brain, and, with the false ideas they frequently convey of characters and events, are the beginning of wrong opinions that are rarely uprooted in after life.

ACCORDING to the daily papers, the interior of the great hall of the Pension Building, Washington, will soon be finished. The walls have already been plastered, and accordingly some idea can now be formed of what the completed hall will look like. A correspondent states that, whatever difference of opinion there may be as to the merits of the outside of the building, it will be generally admitted that the hall is a grand room. In point of size it is said to be larger, with one exception, than any other room in this country, and in point of capacity it stands about fourth in the list of large interiors in the world. It will seat about 15,000 people. Not having visited the building since its completion, we are not in a position to comment on this portion of the work. We are free to say, however, with reference to the exterior that the United States Government, in arranging with an army engineer to put up a building, instead of employing an architect, has secured a barn-like structure, instead of a building that would be a credit to the nation. We hope that the interior arrangements may be perfect, and thereby remove in some measure the reproach now attaching to the structure.

THE PLATES.

In Plate IX we present an engraving of a very artistic piece of sheet-metal work from new designs issued by Bakewell & Mulvins, Salem, Ohio. The subject is entitled "Vulcan," and in some respects is a departure from the conventional idea of the character. The figure is bold, the pose is excellent and the details are carefully considered in all particulars. The extensive use of sheet metal at the present time in statuary, emblematic figures, groups, &c., for public and private buildings, &c., lends special interest to productions of this character.

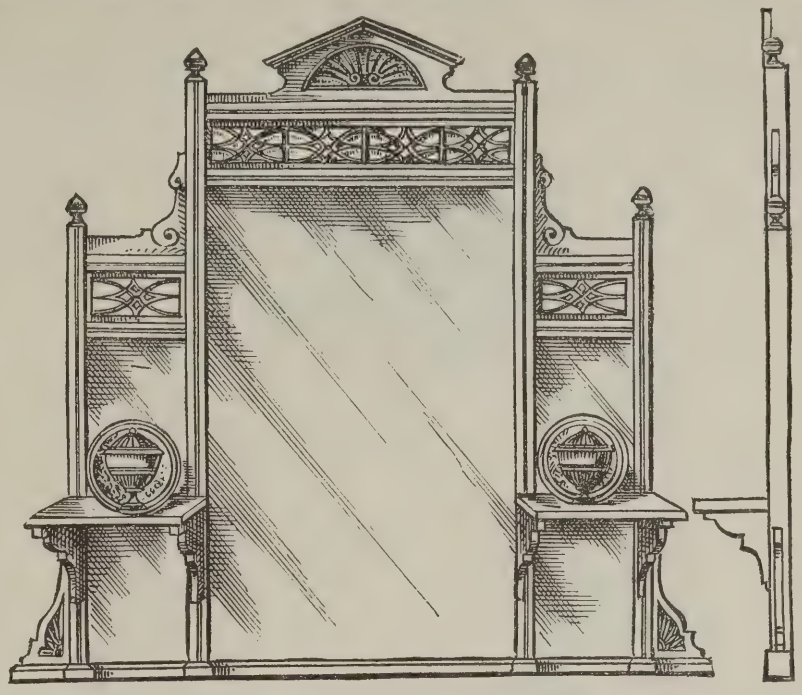
In Plates X and XI are shown elevations and floor plans of a brick dwelling designed by Frank A. Grodavent, of Wichita, Kan. Details of this work are distributed through some of the letter-press pages. The drawings speak for themselves, and description is scarcely necessary.

In Plate XII we present three store fronts designed by Mesker & Bro., manufacturers of galvanized-iron work, St. Louis, Mo. The demand for a cheap and yet attractive finish for store fronts and business blocks in general in the growing Western towns has induced this firm to issue a series of designs drawn to a convenient scale for general use. Our engravings referred to are reduced to size from the designs in their book, being about half the scale of the originals. The work referred to is one that builders in general will appreciate.

Some Designs for Overmantels.

A piece of furniture which is, perhaps, more frequently made by English mechanics and designers than by artisans in our own country is called an "overmantel." The designating term is a new one, but its meaning is clearly indicated by its elements. It is something that goes over a mantel. In house decorating and furnishing it has of late taken the place of the ordinary gilt wooden chimney-glass that was formerly very common. One reason why this change in fashion has occurred is doubtless the accommodation that the new article affords for the display of bric-a-brac which many persons delight in collecting. By reason of its shape it becomes a very suitable receptacle for fancy articles of this general character. The overmantel should form an important feature in the room in which it is placed, whatever it may be, and accordingly there is in it wide scope for the designers' skill. Carved wooden panels, coves lined with plush, stamped leather, or Japanese leather papers (the latter being the cheapest), cupboards fitted with beveled glass doors and other features can be introduced almost without limit. The object of the present article is to give some general directions for constructing an overmantel and to present some designs that are likely to be of interest to amateur cabinet-makers. Referring to the engravings, Fig. 1 shows an overmantel of small size and of an inexpensive character. The extreme width may be supposed to be about 3 feet 6 inches, and the hight 3 feet 3 inches. These dimensions represent probably as small an overmantel as it would be expedient to make, and such a one would be suitable for a small apartment.

The first step in making an overmantel is to get out the pine backings or framework. Great care should be taken in selecting the wood; it should be free from knots, and, of course, thoroughly dry. This is an important feature in connection with overmantel-making. If the wood is not "picked," it will, in all probability, cause considerable annoyance before the job is finished; for instance, an ugly knot might be found on the exact spot where a shelf is to be fixed. If such were the case, it would then be necessary to put the shelf higher up the frame, or lower down, than originally intended, which might, perhaps, spoil the effect of the whole design. The width of the backings must depend entirely on the weight they have to carry, and on the size of the frame. A small frame would only require narrow backings, but for a large size frame wide backings would be necessary. It is obvious, therefore, that the width of the backings must be determined according to the size of the frame. The outside backings for a small overmantel should be about 1 inch thick and ⅞ inch wide; the inside uprights ⅝ inch wide, and of the same thickness. Having got the backings out cut off, the uprights and cross rails to the required lengths, it is advisable to allow ½ inch more than required; the exact length can then be cut off when facings are glued on. By cutting both facings and backings together time will be saved. If only the backings are sawn off in the first instance it will of course be necessary to do the facings afterward. The backings should then be planed over and set out to size ready for lapping or fastening together. The uprights should be gauged from front ½-inch deep, and then cut out from face the exact width of the cross-rails, which will then fit in and lap over the front of vertical rails. Next gauge the cross-rails and cut out from back, so that the back of upright fit in the back of cross-rails, then glue together. Fig. 3 shows the pine frame. The facings should then be got out of ¼-inch stuff, and beads or other section struck. After this is done fix facings on the backings; the uprights should be finished first, as the cross-rails must be fixed between vertical rails. Care should be taken in fitting them; they must butt tightly, so that joints will not be seen. The best way to fix the facings to backings is to glue the latter, and stick facings on, and secure them with hand-screws until the glue is dry. The sides of frame might now be veneered. With regard to the veneering, it is a better and cleaner way of working to glue the veneer, not the backings. If the backings are glued the glue would in all probability, run over the face of the work. The outside of the veneer must be made wet before putting it on sides of frame, in order to counteract the action of the glue on the veneer. Without the use of water it would



Design for Overmantel.—Fig. 1.—Small Overmantel, with Bracketed Shelves.

Fig. 2.—Fret-Work Panel.

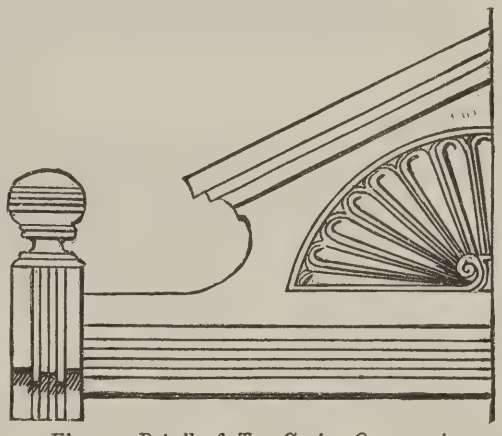


Fig. 4.—Detail of Top Center Ornament.

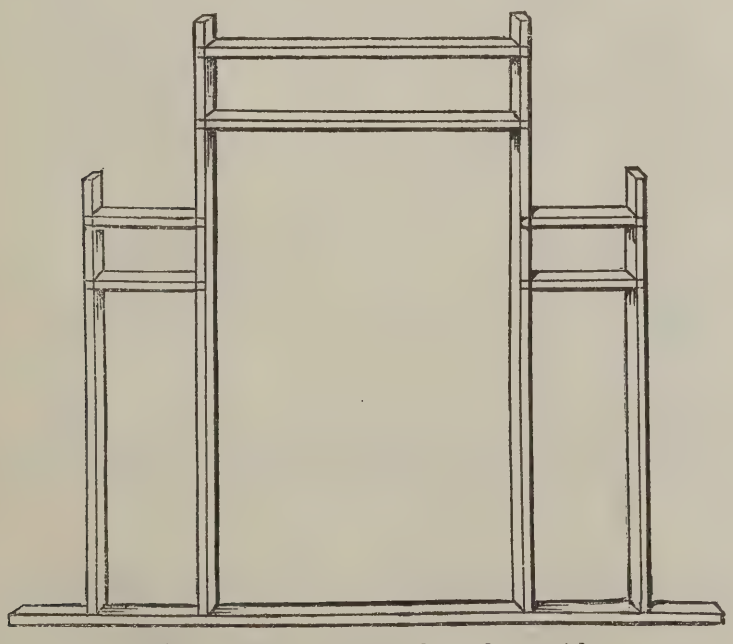


Fig. 3.—Skeleton Framework for Overmantel.

Fig. 5.—Bracket for Shelves.

curl up and peel off. The front and sides of uprights and cross-rails should now be planed over and papered up. Use middle No. 2 sandpaper first to take the roughness off, and then finish with No. 1½, which is a finer paper. No. 1½ paper will be fine enough to finish off a cheap-glass overmantel, but for better-quality work No. 1 paper should in-

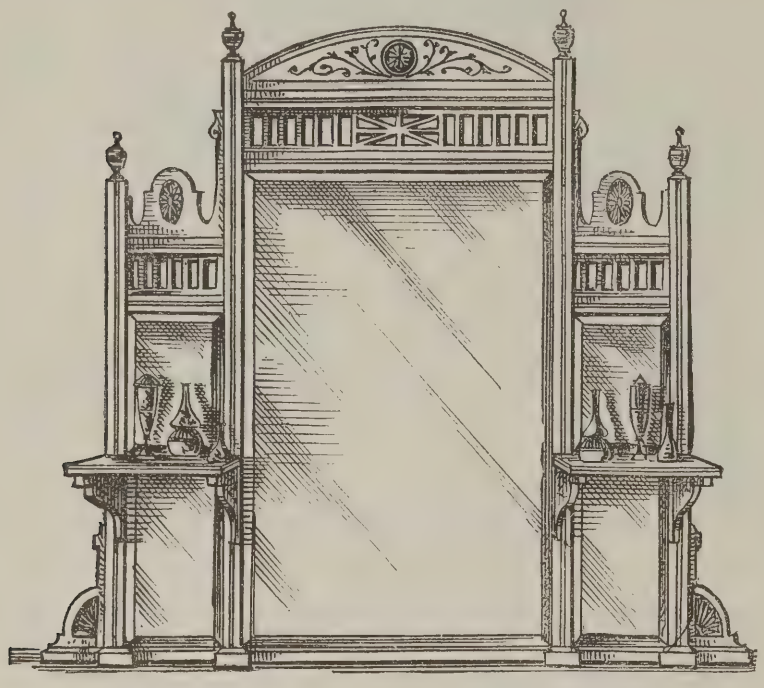


Fig. 6.—Design for Overmantel a Little Larger in Size.

variably be used. The pediment, brackets, shelves and frets must be cut of ½-inch stuff with a saw, and shelves (which might be 4½ inches deep), and shelf brackets out of ¾ inch stuff. This thickness of wood is substantial enough for a small inexpensive overmantel; but, of course, in more costly work, heavier stuff must be used. After the pediment, shelves, &c., have been cut out, they should be cleaned up. The top molding of pediment might now be got out of a piece of square solid wood, and fixed in the same manner as described for facings.

The quickest way to work the molding would be to use a set plane. Set planes are made for almost all ordinary moldings which are required. In the event of this most useful tool not being in the possession of the operator, the molding could be worked in the following way: First chamfer the edge of the wood the width of the hollow, and then use a round plane to work it out. The pediment and brackets must be put in the hands of the carver to be enriched. Fig. 4 shows detail of pediment. The wood for frets should be at least ¼ inch thick; if thinner, they would be liable to get broken, and would also appear flimsy. Cut out and prepare wood for fret cutter to perforate the pattern required. Fig. 2 represents detail of fretwork on a large scale, and Fig. 5 shows shelf bracket. The overmantel should now be ready to pass into the hands of the polisher. As soon as the polish is quite hard we may commence to fit up. The shelves might be fitted first; they should be screwed on from the back of frame. The pediment might then be screwed and side brackets nailed on. It is not necessary to screw side brackets. The frets should be fixed with a fillet or bead tacked in at back. Sometimes the frets are fastened in with French pins, but fillets or beads hold them more securely, and are therefore to be preferred. The overmantel will now be finished with the exception of the glass, which, when added, will complete the whole of the work.

We also append designs for two other overmantels (Figs. 6 and 7), which should be made in a similar manner as Fig. 1. As will be seen, they differ merely with regard to the pediments, frets and brackets. Fig. 7 has an additional shelf on each side, which might either be retained or dispensed with as desired.

Fireplaces.

A writer in the London *Standard* has been investigating the general subject of fireplaces, and has presented a general survey of the subject indicating the opinion in which the fireplace is held by Englishmen, while, at the same time, some of the history of fireplaces and their methods of working are referred to. The origin of chimneys is indicated, and forms an interesting paragraph. The article in question is as follows:

All our ideas of comfort and sociality center round the fireplace. Few Englishmen would be willing to forego the cheerful blaze which welcomes their entry into a room through the winter months; and this despite the fact that our method of producing artificial heat is more defective and primitive than any other of our domestic contrivances. The pitch of civilization at which we have arrived is a high one, yet the fireplaces of the ancient world were more ingenious and practical than those which warm the homes of the majority of Englishmen. We burn a quantity of coal in such a manner that the greater part of the heat it throws out is entirely wasted up the chimney. On a cold winter's day we are obliged to pile up a fire that it is impossible to sit near, and yet the remote parts of the room are very little warmer than they would be were there no attempt made at creating an artificial climate in it.

The earliest savages seem to have been ignorant of fire, and there are many traditions regarding the manner of its discovery. Primeval man was not slow to appreciate the grateful influence of artificial heat, and the earliest social gatherings of the world were round the embers of some forest tree. As the intelligence of mankind increased, they began to seek some means of sheltering themselves from the cold of winter and the fierce heat of the summer sun. Caves were without doubt their earliest habitations, and in these they made fires, in spite of the inconvenience the smoke must have caused, for there was no outlet for it other than the hole by which they themselves crept in and out. Even when men learnt to build houses, and collect together in villages, the same rude method prevailed. Fires were lighted in the middle of the floor, but a hole in the roof was made which, to some extent, permitted the escape of the smoke. It would seem that the ancient Egyptians were accustomed to warm their dwellings by means of pans filled with live charcoal, which they carried about from one apartment to another, as they found it necessary. To this people is ascribed the invention of the bellows. The Jews during their wanderings in the wilderness adopted the same course as that followed by primitive savages and Arabs of a later day. They made their fires in the center of a small conical tent, allowing the smoke to finds its way out through a hole at the apex of the cone. But when they were settled in Palestine, where winters were cold and lengthy, and where wood was plentiful, they appear to have adopted regular hearths. Still there were no chimneys, and the result was that the smoke spoiled all the furniture and ornaments. To avoid this it became customary to set aside certain apartments for use during the winter months, and to light fires in none other. Holes in the roofs of these winter dwellings permitted the escape of a certain proportion of smoke; but the absence of chimneys allowed it to hang about the streets, so much so that Baruch remarked on "the faces that were blacked by the smoke that cometh out of the temple."

From the descriptions which Homer gives

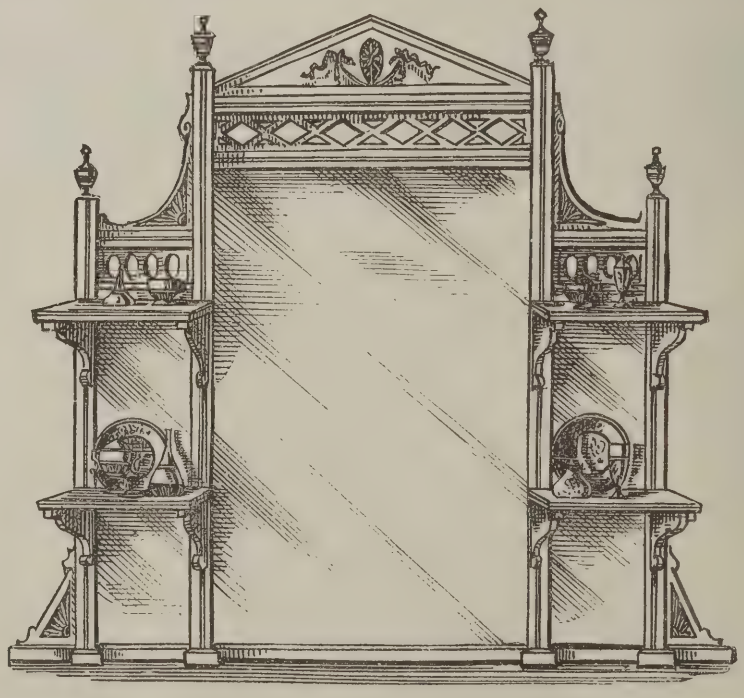


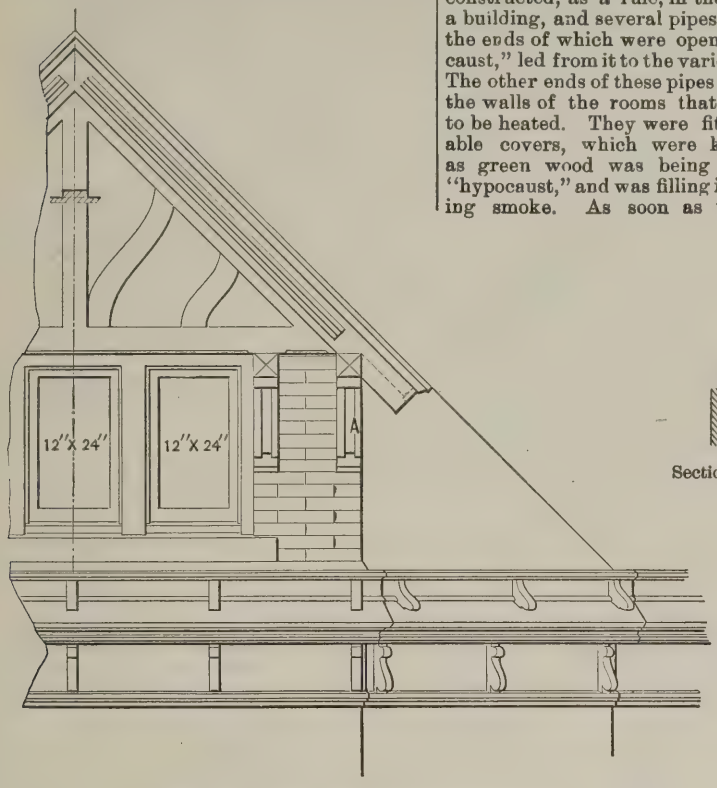
Fig. 7.—Design for Overmantel with Double Shelves.

of the home life of the ancient Greeks, we gather that they, too, made a large fire upon a central hearth, which, besides affording them warmth, was used for cooking pur

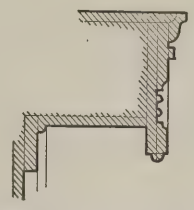
revived of late years, and which was claimed as a modern invention early in the present century. The chief fireplace in a Roman house was called the "hypocaust." It was constructed, as a rule, in the lower story of a building, and several pipes of baked clay, the ends of which were open to the "hypocaust," led from it to the various apartments. The other ends of these pipes protruded from the walls of the rooms that were intended to be heated. They were fitted with movable covers, which were kept on so long as green wood was being burned in the "hypocaust," and was filling it with suffocating smoke. As soon as this wood was

your body as hot as the other is cold. For warming rooms not sufficiently heated by the "hypocaust," the Romans used small braziers which, filled with burning charcoal, stood in the middle of the floor. The excavations at Pompeii have shown us that these braziers were often most elegantly designed, and formed ornaments to a room that no modern decorator would despise.

The earlier inhabitants of this country, the savages who so stoutly opposed the victorious career of Julius Cæsar, built their fires in the center of their dwellings, whether these were wicker huts, caves, or roughly built cabins of loose stones. In all of these the

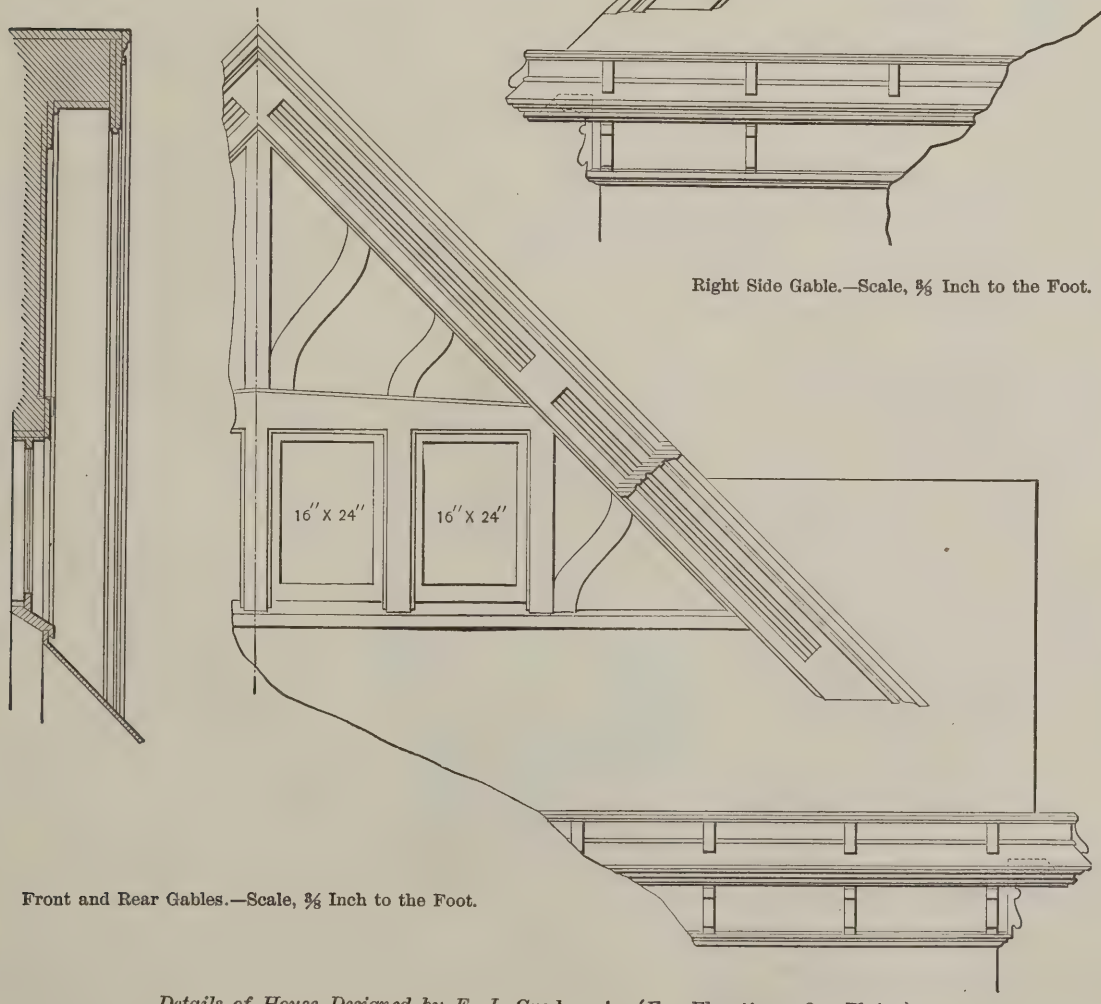


Left Side Gable.—Scale, ⅜ Inch to the Foot.



Section Through Front and Rear Gables.

Right Side Gable.—Scale, ⅜ Inch to the Foot.



Front and Rear Gables.—Scale, ⅜ Inch to the Foot.

Details of House Designed by F. J. Grodavent. (*For Elevations, See Plates.*)

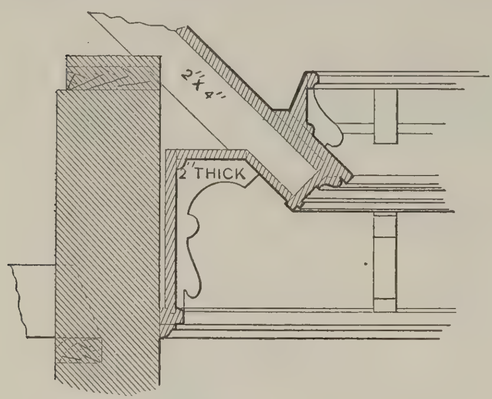
poses, and was also their source of light. The Romans made great advances in the artificial warming of their homes, though they appear to have found no means of abolishing the smoke nuisance. Their most usual method of heating houses was in reality the hot-air system which has been

thoroughly charred, the covers were removed, and hot air from the "hypocaust" below flowed into the chamber, raising its temperature to an equitable warmth. How much more pleasant to spend a cold evening in a room heated by this method than to sit in front of a blazing fi e with one side of

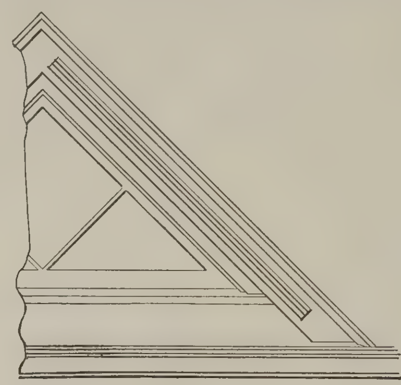
smoke must have been equally stifling. In the later feudal days that followed the Norman Conquest we find the first rude attempt at a chimney. Something of the kind was necessary, for the roofs of the huge strongholds that nobles of that day were so fond of erecting were used as terraces for defense,

and an exit for smoke in them would have been of serious inconvenience. Accordingly a large recess was built at one side of the grand hall, and on its hearth wood was burnt. Over this hearth was a great funnel, which sloped up through the thickness of the wall until it reached the outer air, and through which a good deal of smoke managed to make its escape. Later on, in the Middle Ages, men went back to the primitive customs of their savage ancestors. A great hearth occupied the middle of the hall, and on it stood the andirons for supporting the ends of the brands. On the roof immediately over the hearth was a turret, or louver, filled with boards so arranged as to permit the escape of smoke and to exclude wind or rain. Those who dwelt in this bare, drafty room were scarcely better off than if they had been in the open air. The fire threw no heat beyond a few feet from the hearth; all the heated air went through the louver with the smoke. Those who crowded so closely round the blaze as to derive some benefit from it were subjected to the strong currents of cold air that swept toward it from every side. And then the smuts! Few of the flakes of charcoal found their way up to the louver, and thence out into the air; they floated about the hall, settling on everybody and everything. Stormy weather increased the discomfort. Had the bonfire been in the open air, it would have been possible to keep to windward, and so avoid the suffocating smoke; but as it was, there was no means of flying from its miseries. The wind prevented its exit from the louver, and it swept about the hall, keeping all the inmates in a state of thorough discomfort.

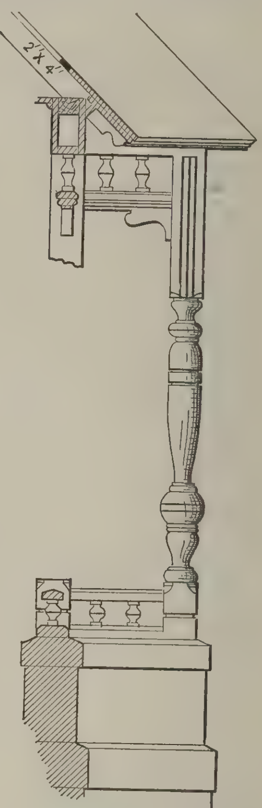
Coal did not come into use as a fuel until the seventeenth century. Henry III. granted a charter to the inhabitants of Newcastle to dig in as early as 1239; but it was supposed to be injurious to the health of those who sat in the room where it was burned, and so wood and turf continued to be the only fuel. By the time that coal had conquered the prejudices against it, chimneys had been introduced. Leland, speaking of Bolton Castle, says in his "Itinerary": "One thynge I muche notyd in the hawle of Bolton Castle, how chimeneys were conveyed by tunnells made on the syde of the walls betwyxt the lights in the hawle, and by this means, and by no covers, is the smoke of the harthe in the hawle wonder strangely conveyed." The word "chimney" is used by other writers before Leland, but they only intend it to mean "fireplace." The feeling against coal had been so strong that laws had been passed forbidding its use within London, and we read of men being tried, convicted, and executed for the crime of burning it. When at last the prejudice was overcome, the capacious hearth was superceded by the smaller and more compact one now in use. Chimney-pieces, at first of carved wood, and afterward of marble, were introduced.



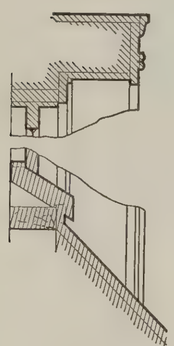
Main Cornice.—Scale, ¾ Inch to the Foot.



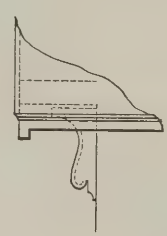
Right Side Gable.—Scale, ⅜ Inch to the Foot.



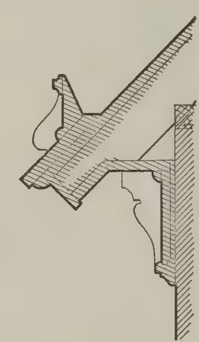
Porch Finish.—Scale, ⅜ Inch to the Foot.



Section of Side Gable.—Scale, ⅜ Inch to Foot.



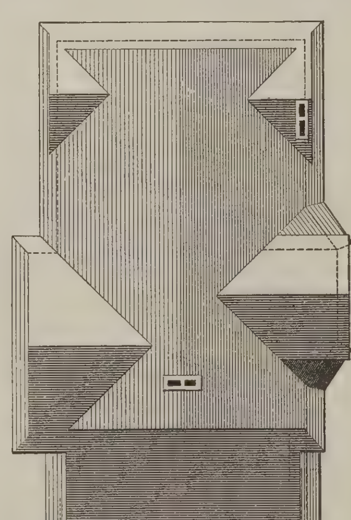
Bracket at A in Left Side Gable.—Scale, ⅜ Inch to the Foot.



Wing Cornice.—Scale, ¾ Inch to the Foot.

Piazza Finial.—Scale, ⅜ Inch to the Foot.

Details of House Designed by F. J. Grodavent. (For Elevations, See Plates.)



Roof Plan of House Designed by F. J. Grodavent.—Scale, $\frac{1}{16}$ Inch to the Foot.

Though all our other domestic appliances have been altered for the better of late years, we still cling to the form of fireplace which became general with the introduction of coal as a heating agent. We are worse off for means of distributing heat over our dwellings than were the Romans who lived 2000 years ago. And yet this is called the age of invention and progress.

The Theory of the Arch.

According to Joseph Gwilt, it was comparatively late that the theory of arches attracted the notice of mathematicians. Dr. Hooke gave the hint that the figure of a perfectly flexible cord or chain, suspended from two points, was the proper form for an arch. Galileo considered the catenary as a parabolic curve, and John Bernouilli appears to have been the first who discovered its nature. Dr. Gregory ("Phil. Trans." 1697) published an investigation of its properties, and observes that the inverted catenary is the best form for an arch on account of its lightness. This is true so long as it is not pressed by an extraneous weight. It is not, however, capable of bearing a load on any part, much less of being filled up on the spandrels, which must be the case in practice. Other considerations must be involved before it can be fitted to receive a roadway or other weight, either upon its crown or haunches. In 1695 La Hire, in his "Traité de Mécanique," established by the theory of the wedge a method of determining the proportion in which the lengths of the voussoirs should increase as they approximate the springing. The historian of the Academy at Paris intimates, in 1704, that Parent, following the same theory, but without proceeding further than mechanical delineation, gave the extrados of a semicircular arch, together with its horizontal drift.

Couplet wrote two memoirs in the volumes of the French Academy for the years 1729 and 1730. He trod in the steps of La Hire and Parent, and made but liitle advance in the scientific investigation of the subject. He treats chiefly on the drift or shoot of semicircular arches and the thickness of the piers, considering the arch-stones as infinitely smooth, and experiencing no resistance from friction. In the volume of the transactions of the French Academy for 1734 is a memoir by Bouguer, "Sur les Lignes Courbes propores à former les Voûtes en Dôme." In this is an analogy between cylindrical and dome vaulting, the one being supposed to be formed by the movement of a catenarean curve parallel to itself, and the other by the revolution of the same curve about its axis. The wedge theory has since been followed by Belidor and others on the Continent, and the late ingenious Mr. Attwood in this country. Such was the state of the progress toward a perfect development

of the true theory of arches when our countryman, Mr. Emerson, in 1743, investigated the nature of a proper extrados of the different curves. Casting a new light upon this curious and useful subject, he exposed the fallacy of La Hire's wedge theory, and it is now completely exploded. Dr. Hutton in his "Principles of Bridges," and in the first volume of his tracts, pursued the subject on the principles laid down by Emerson. He added the method of finding an intrados to a given extrados, which indeed seems the principal addition he made to this branch of science. Bossut, on the Continent, republished with additions, in his "Cours de Mathématique," a tract on the subject; and in 1785 Mascheroni published at Bergamo a work entitled "Nuove Ricerche sull' Equilibrio delle Volte," in which there are some propositions upon the equilibrium of arches, but it principally relates to domes on circular, elliptical and polygonal plans.

The Circle Set-Square.

Some time ago the *Mechanical World* published a description of a graphical method for developing the circumference of a circle on a straight line, and the solution of other problems of a like nature. From this article, which was in a form not altogether suitable for our columns, we have prepared the following account of the method explained by our contemporary:

The setting out of a circumference on a straight line is an operation frequently required in connection with pattern cutting and other work, in which case it is necessary either to make calculations or use tables which give the value with a number of decimals in convenient to set out even approximately with scales divided in the usual way or to measure round with dividers, which is equally inconvenient and even more incorrect. A method of solving the problem in a convenient manner, and with as much accuracy as is possible considering that any value of the ratio between the diameter and circumference which we may use is only a more or less close approximation, was indicated by Mr. E. Bing, of Riga, several years ago, but seems to have become little known, so that we think its reproduction will be serviceable to many of our readers. It consists in the use in addition to the ordinary T-square and compasses of a set-square, one angle of which is 27° 35′ 49.636″. This set-square can be easily constructed, as its sides adjoining the right angle are in the proportion of 23 to 44; for instance, one side may be 5¾ inches and the other 11 inches in length. Such a set-square is shown in Fig. 1, the letter S denoting the angle 27° 35′ 49.636″, and the sides A C and D C being respectively 11 and 5¾ inches in length. Should the nature of the work make a larger set-square desirable, the length of the sides D C and A C may be increased indefinitely, provided the ratio 23 to 44 be maintained. In the succeeding diagrams the several positions of the set-square may be easily followed if we remember that the letter S always denotes the angle 27° 35′ 49.636″, and that the sides A C and C D are placed similarly as in Fig. 1. In the following solutions, for the sake of brevity, the set-square, above described, will be called the circle-square: 1. Given the diameter *d*, to set out the circumference. Set out on line A E in Fig. 2, A D = 2 *d*. Place the long side of the circle-square against a T-square held parallel to A E, and draw from A and D lines along the other sides, intersecting each other at C; turn the circle-square over so that it occupies the position shown by C H B and draw from C a line intersecting A E at B. Then A B will be the length of the circumference of a circle whose diameter is *d*. 2. Given the circumference to set out the diameter. In Fig. 3 make A B = circumference; draw lines from A and B with the angle S occupying the position shown in the cut, and from their point of intersection draw C D, with the other side of the circle-square placed as shown in A C D, which will intersect A B at D. Then A D is twice the diameter, and may be halved by compasses or by drawing from D the line D F, parallel to C B, and from F, the point of intersection, the line F G, perpendicular to A B, A G being the diameter sought. This operation, it will be observed, is just the reverse of the one described in connection with Fig. 2. 3. Given the diameter of a circle to set out the side of a square having the same area as the circle. Describe the circle and draw a diameter, A D, through the center E, Fig. 4, with the longest side of the circle-square, the shortest side being placed against the T-square, and draw from A the vertical line A C. Then A C will be the side of the required square. 4. Given the side of a square to find the diameter of a circle having the same area as the square. Draw A C, Fig. 5, equal to L, the side of the square. Draw from A and C, with the angle S of the circle-square, lines intersecting each other at O; then O is the center of the required circle, and O A = O C, the radii, or 2 O A = diameter sought. The solutions given above of the apparently difficult problems are exceedingly simple, and certainly take no more time than looking up the values in the tables of circumferences, areas, squares and square roots.

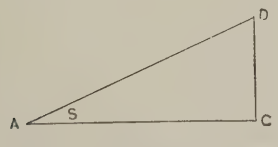


Fig. 1.—Showing Proportions of Triangle.

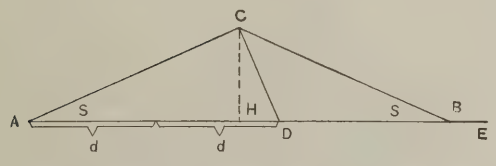


Fig. 2.—Setting Out Circumference from Diameter.

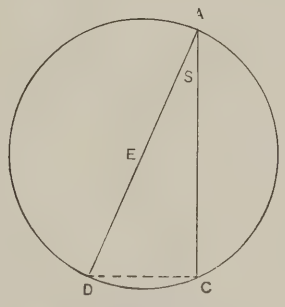


Fig. 4.—Finding Square of Same Area as the Circle.

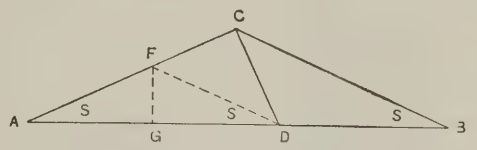


Fig. 3.—Setting out Diameter from Circumference.

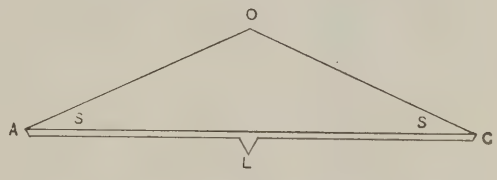


Fig. 5.—Finding Circle of Same Area as Square.

The Circle Set-Square.

The Advantages of Applied Mathematics.

The general drift of educational matters at the present time is in the direction of practical work rather than simple theory. The evidence of this is in the trade schools and manual training schools which are springing up all over the country, and the equivalents of which have long been in existence in different parts of Europe. Our attention has recently been called to some remarks upon the modes of teaching mathematics, from the pen of H. Conybeare, which will perhaps interest our readers. The quotations that he indulges in from ancient writers on mathematical subjects compared with our modern school books show the progress that has been made in the direction of practical work. There is yet much to do and much that may be said in favor of teaching applied mathematics, rather than holding the student simply to theoretical training. The writer referred to says:

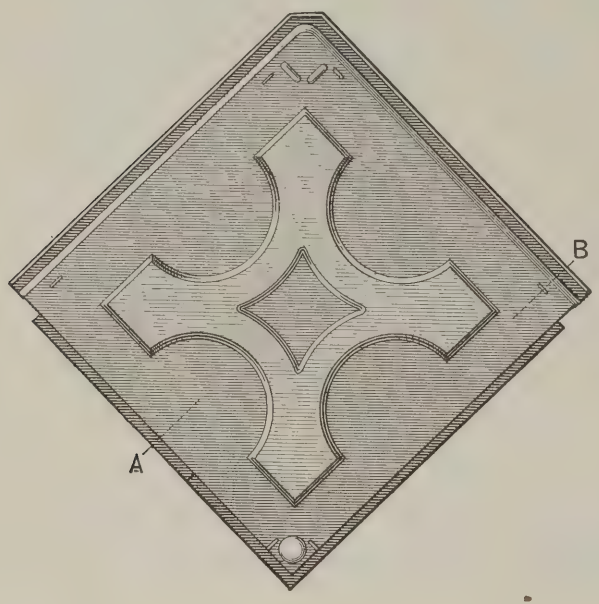
There is no valid reason why applied mathematics should not be more generally substituted in our schools for pure mathematics, and why every example put before scholars should not be a practical instance of the application of mathematics to questions of business or construction. Such a mode of teaching would give a much greater interest to these studies—it would familiarize students with the use of mathematics, and teach them to regard the science of number as a facile tool of almost universal applicability to the everyday purposes of civil and military life. In the earliest works on algebra extant—by Brahmaguphta, who lived in the seventh century of our era, and Bhascara who flourished in the twelfth—there is a constant endeavor to give the examples an amusing character, sometimes carried to the excess of lowering science to the level of a lady's plaything. Take a few examples at random from Bhascara: "Ten times the square root of a flock of geese, seeing the clouds collect, flew to the nearest lake; one eighth of the whole flew upon the edge of the water among a multitude of water-lillies; and three couples were observed playing on the water. Tell me, my young girl with beautiful locks, what were the whole number of the geese?" Again, "Beautiful and dear Salivati, whose eyes are like the fawn's, tell me what is the number resulting from 135 taken into 12? If thou be skilled in multiplication, by whole or by parts, whether by subdivision of form or separation of digits, tell me, auspicious woman, what is the quotient of the product divided by the same multiplier?" Colone Lloyd, one of the special commissioners of the Great Exhibition, in his report to Lord Granville, observes that "In France, so great are the facilities afforded by the Government educational establishments—such as the Conservatoire des Arts et Métiers and the Ecole des Arts et Manufactures—that the acquirement of high scientific knowledge in connection with interesting demonstrations and manipulations of all descriptions becomes to the youth of France so fascinating that at an early age they often pass an examination showing such high qualifications in both science and the arts that their services are sought for by all the manufacturing countries in Europe."

A new application of electricity is credited to Mr. James Semple, of Cincinnati, corresponding secretary of the National Association of Master Plumbers. It is in the discharge of water for flushing purposes from the tank, which, it is claimed, can be done without any reference to the location of the tank, and which operation is effected in much the same manner as bell ringing. The plan as described involves the attachment of the valve of the flushing tank to one end of a lever which has an electro-magnet near the other end, while an electric button is placed near the closet. When this button is pressed the circuit is closed, and the lever being attracted by the magnet the valve is opened and the water is discharged. A small battery is used for the purpose, but where electric bells are already in use the batteries can be still further utilized in this direction.

NOVELTIES.

A New Sheet-Metal Tile.

The Cortright Metal Roofing Company, whose office and factory is at the corner of Broad and Race streets, Philadelphia, with Western office at 122 La Salle street, Chicago, have recently perfected a new form of roof covering, in the laying of which the work is commenced at the ridge. Illustrations of this roofing are presented on this page. The new goods in contradistinction to other articles are to be known as tile, and are the joint invention of Mr. S. P. Darlington, president of the company, and Mr. L. D. Cortright, vice president. The shingle or tile which has heretofore been manufactured by this company had a mitered corner. In the new construction this has been entirely avoided by means which are very ingenious, and which cannot fail to command the admiration of every sheet metal worker. Referring to the illustrations, Fig. 1 shows a front view of the new tile, the scale of the cut being 2 inches to the foot. Fig. 2 shows a back view of the same. Before describing other features of construction and referring to the other illustrations, we will give attention to the means by which the miter joint in this article is avoided. The tile is provided on two sides with what may, for lack of a better term, be called "socket" edges. In laying, the opposite edges of adjacent tiles are inserted in these sockets. The reader will comprehend the shape of the blank used to form this tile by referring to Fig. 2, and supposing the bent edges, just mentioned, to be straightened out. The blank would show a square with a corner cut out, of the form indicated in Fig. 7. The piece shown in Fig. 7 is cut out in this way when the blanks are being brought to shape, and then, after the tile is folded, it is inserted in place, giving the form indicated in Fig. 2. The lap of the arms of the corner piece is shown by the dotted lines. This corner piece has a slight flange turned down along the diagonal edges as indicated in Fig. 7, which bears against the surface of the back of the shingle as shown in Fig. 2. It is there soldered in place, and constitutes a barrier, against which the tile of the succeeding course rests. It also forms an effectual obstruction against any water that would be likely to penetrate so far. The singular part of this construction is that the blank cut from the sheet of tin in the flat exactly fills the space in the finished tile as we have described. In forming the edges and joints of this tile, care has been given to their shape and the bearings of the different surfaces, so as to secure inside gutters and a free discharge of any water that may collect in them, thus making the roof safe from such damage as would occur by the formation of ice inside of the joints. In Fig. 1 we have indicated the location of the sections shown in Figs. 3 and 4. The two lower edges of the tile are bent, as shown in Fig. 3. The two upper edges are bent, as shown in Fig. 4, with the exception of the upwardly-projecting bead in the face of the tile to the left of the letter B. By reference to Fig. 1 it will be seen that the section is taken through one of the lug-gauges which are provided to facilitate laying. The use of this lug becomes apparent by reference to Fig. 5, which represents the joint taken at a point indicated by letter C in Fig. 6. The latter shows how several tile are united in laying on the roof, and the former how the flange on the upper edge of the tiles in one course fits into the socket of the lower edge of the next course. These several flanges and edges are bent in such a way as to make a very tight fit, as will be seen by inspection of the cut. In fact, the entrance of B into the socket A forces the latter apart, causing the different surfaces of the metal to assume the relative positions indicated in Fig. 5. It will be seen that by this means an inside gutter is provided, and that the contact of the parts is such as to overcome the danger of capillary attraction, causing leaks. The projecting flange outside of the socket-joint, as shown in Fig. 3, forms a convenient nailing strip in laying the tiles. The form of the joint is such as to provide for contraction and expansion in the freest and best manner. As already mentioned, in laying these tiles the work is commenced at the ridge, instead of at the eaves. Fig. 8 represents a diagram which the company are sending out with their goods for the instruction of those who have the work to put in place. The ridge is shown covered with the Cortright metal ridging, an article with which our readers are already somewhat familiar. This is first put in place by nailing through the projecting flanges in a manner similar to that employed with the tiles already described. A portion of the tiles are then cut off as indicated in the diagram, for which also special directions are furnished, and are put in place, forming



Novelties.—Fig. 1.—Front View of the Cortright-Darlington Tile.—Scale, 2 Inches to the Foot.

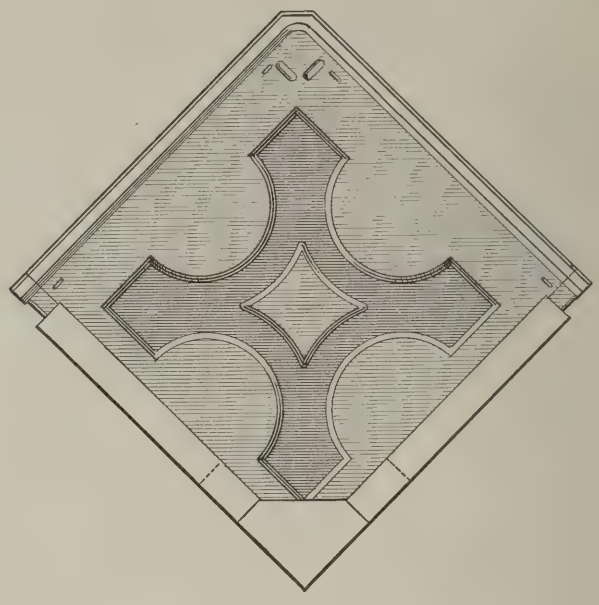


Fig. 2.—View of the Opposite or Under Side of the Tile.

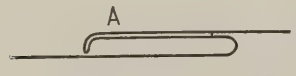


Fig. 3.—Full Size Section on Line A in Fig. 1.

Fig. 4.—Full Size Section on Line B in Fig. 1.

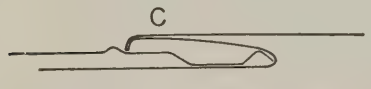


Fig. 5.—Full Size Section through Side Joint as made in Laying the Tile, and as Indicated by C in Fig. 6.

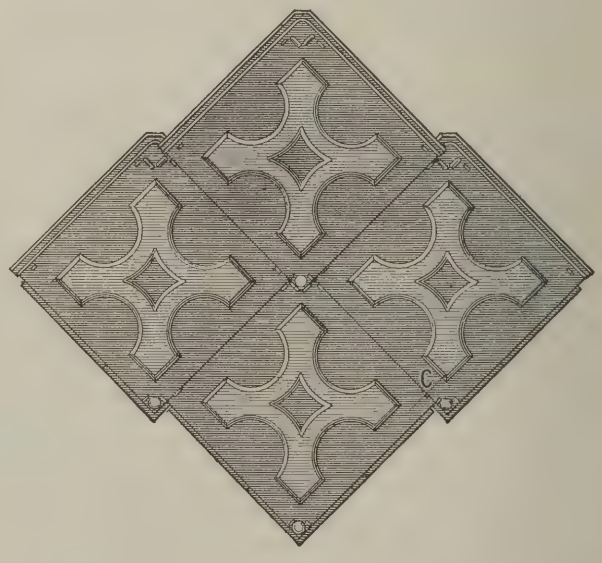
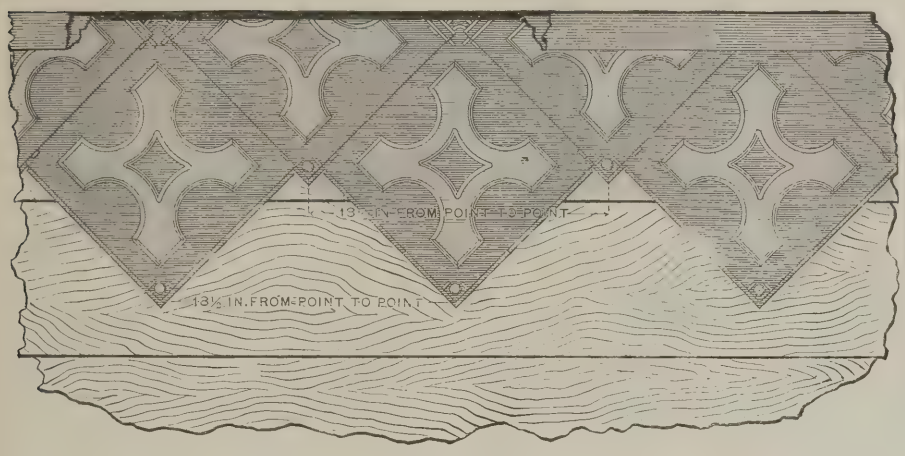


Fig. 6.—Four Tiles as Joined in a Roof.

Fig. 7.—Corner Piece Forming Weather Hood.

the first row. The second course is then put in place by slipping up between adjacent tiles until the gauge-lugs already referred to come in contact with the bent edge of the socket joints, as indicated in the section, Fig. 5. From this it will be seen that the



Novelties.—Fig. 8.—Diagram Illustrating Plan of Commencing the Cortright Roof at the Ridge.

plan of laying the tiles is very simple indeed, and that the work of finishing the roof proceeds without danger of damaging it by climbing over it after the work is in place, as is the case with other patterns of sheet metal tile and shingles, slate, &c.

The tile here shown are made from a special size of tin, and are so proportioned as to cover exactly 1 square foot to each tile. The measurement from point to point in laying, as indicated by the dimensions in Fig. 8, is 18½ inches. When the tiles are in place, it will be noticed that they are in staggered rows diagonally of the roof, as shown in Fig. 6. The embossing of these tiles is very slight, but is enough to give them stability and at the same time contribute a pleasing appearance to the roof. Near the upper corner of the tile, as shown in Fig. 1, it will be noticed there are two projecting lugs extending in directions opposite to the gauge lugs on the sides already referred to. These, in a measure, shut up the space underneath the projecting corner of the tile in the next course above, all of which will be understood by examination of the center portion of Fig. 6. The boss in the lower corner of the tile forms a sort of hood, and in shaping the tile this is bent down out of the plane of the general surfaces so as to make a close fit. At the same time ample space is allowed for the discharge of such water as may get into the concealed gutter, indicated in Fig. 5, and which empties underneath this hood. There seems to be no danger of water driving up through the four corners that come together at this point, on account of the protection provided by means of the inserted piece shown in Fig. 7 and already described.

Kirkwood's Wind Engine.

The Progress Engine and Machine Works, of Summerfield, Md., are now putting on the market the Kirkwood Wind Engine, shown in Fig. 9. The engine is made entirely of iron and steel. The wheel is composed of a cast-iron hub fitted to main shaft, the hub being flanged on the back and extending back over the bearing. By this arrangement the weight of the wheel is placed near the center of shaft and bearing, preventing, it is claimed, excessive wear on the end of the bearing, making the wearing parts more durable and causing the wheel to run in lighter winds. Into the hub are screwed wrought-iron rods, extending outward to a rim of wrought iron and riveted to it. This rim forms the center of the wheel into which the vanes are secured. The vanes are made of sheet iron, the edges being rolled over steel rods threaded on the ends. The ends of the rods are placed in holes in the rim at the proper angle across the face of it, with nuts on the outside and inside of the ring. The vanes extend outward, with their extreme ends passed through openings in outside bands which encircle the wheel, and are secured in the same manner as in the central rim. Cross pieces are bolted from one band to the other. There are 36 vanes in 10 foot wheels, with two rods in each vane, forming 72 stay-bolts to bind the wheel together, making it rigid and strong. The engine is claimed to be entirely free from such defects as the vanes becoming loose and blowing out, and liability to be torn to pieces in storms, and to present, morever, a comparatively large surface to the wind. The design combines a maximum of strength with a minimum weight. The tail vane or rudder is composed of two tail bars or tubes of wrought iron, their ends fixed in a casting on a vertical tube, and braced by rods extending from the top of this tube to the center of the tail bars. They are braced together at intervals by castings upon which the vanes are mounted and supported by flat bands and elliptic braces. The edges of the sheet iron vanes are rolled over rods to stiffen them, have the strongest as well as the lightest vane or rudder in use. As regards the governing principle, we would remark that the wheel is mounted on a bracket made to revolve on a vertical tube to which the tail vane is rigidly fixed. On the bracket is a circular flange; to this flange is attached a chain passing from the flange to an eccentric-shaped wheel, pivoted on and at right angles with the casting, to which the tail is fixed. The center of wheel is set 1½ inches to one side of the center of the vertical tube, the wind exerting the greatest pressure on that side forces the wheel around in a storm parallel with the tail vane. This winds the chain on the circular bracket flange, draws on eccentric, and lifts the weight on the lever attached to the eccentric to a horizontal position. The eccentricity of the chain wheel increasing the resisting power of weight causes the wheel to offer greater resistance to the wind the nearer it approaches a parallel line with tail, and lessens the resistance as the wheel is drawn into the wind at right angles to tail. In this way a simple regulation is obtained, the action being quick and effective, never allowing the wheel to go entirely out of the wind and stop (unless pulled out) but causing it to run in storms as well as light winds with safety. The weight to which we have referred is a thin flat surface set broad side to the wind at all times, but presenting no surface to the wind when the wheel is running full in the wind. The weight is then low down behind the wheel. When the latter is deflected out of the wind or pulled out to stop it, the weight is raised to a horizontal position on the end of the lever on opposite sides of center of pivot from the wheel, and at right angles with it, balancing the wheel on the tower, and presenting the same resistance to the wind as the edge of wheel. The shaft is of cold rolled iron and the bearings are long and recessed in the center to hold oil. The crank and wheel hub are neatly fitted to the shaft and keyed upon it; The connecting-rod is bushed with brass and can be replaced when worn at little expense; the motion is transferred from the crank by a connecting-rod to a rocking arm and then to the pump rod, doing away with sliding surfaces. The entire machine is mounted upon and revolves with a wrought-iron tube resting upon and projecting through the tower-cap down into the tower, and supported at its lower end by an iron step. This arrangement has proven to be a good and reliable pivot. We may add that these engines have been in use for the past four years with most satisfactory results.

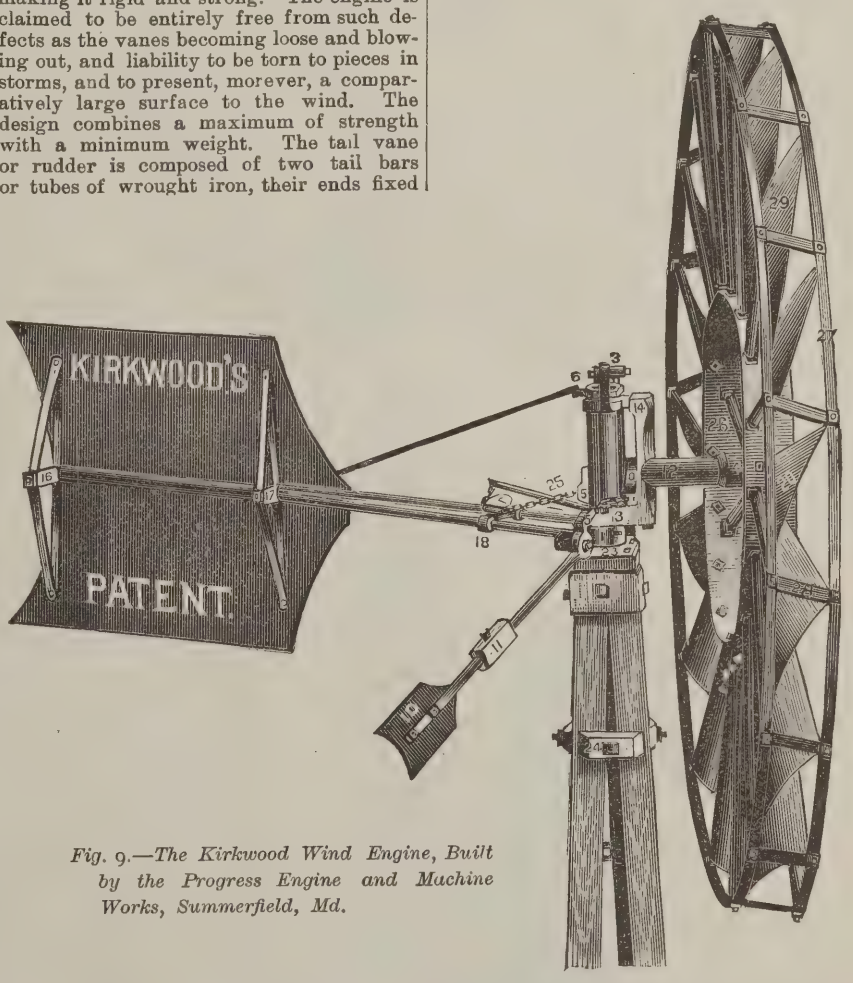
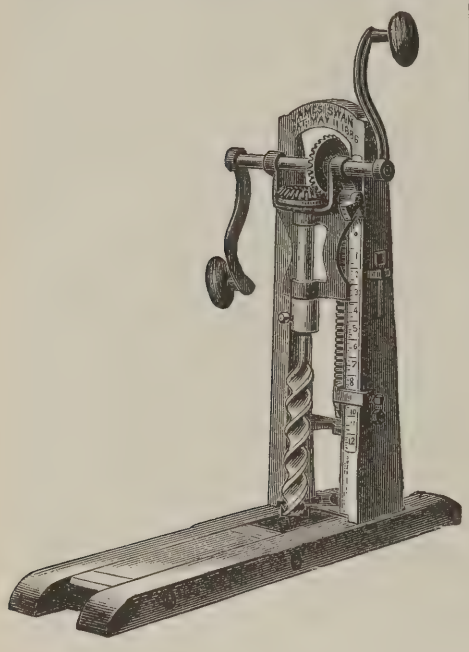


Fig. 9.—The Kirkwood Wind Engine, Built by the Progress Engine and Machine Works, Summerfield, Md.

New Boring Machine.

The Russell & Erwin Mfg. Company, of New York City, are just putting upon the market a new boring machine that has many features to commend it to the attention of



Novelties.—Fig. 10.—New Boring Machine, Upright Pattern.

builders and mechanics in general. The machine is made in two forms, both of which are shown in the engravings, Figs. 10 and 11. In Fig. 10 the frame carrying the working parts is fastened rigidly in an upright position. In Fig. 11 the frame is pivoted near the base, and is provided with an adjustment by which it can be set at any angle either to the right or left of the vertical. The special features to which the makers direct particular attention include the fact that the frame being of iron the machine is free from the objections against other forms—namely, that of warping and shrinking and getting loose so as to rattle. At the same time the entire weight of the machine is no more than that of the ordinary wooden article. By referring to the engraving it

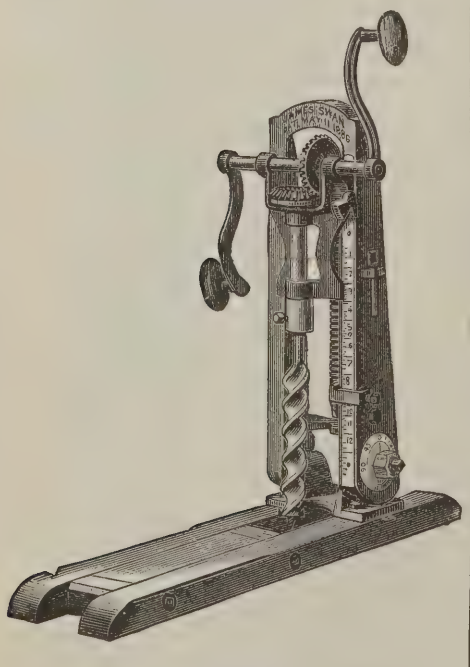


Fig. 11.—New Boring Machine, Adjustable Pattern.

will be seen that there is a graduated gauge down the right hand side of the frame and an adjustable stop. This serves to control the depths of the hole that is to be bored. The stop may be fastened at any point that is desired. When the auger penetrates to this depth it is stopped automatically. The same motion serves to throw into gear a rack that is swung at the back of the frame, so that by continuing the motion of the handles the auger is withdrawn and is carried back to the top, where it is automatically suspended and the rack thrown out of gear, leaving the machine in condition for movement to the next hole to be bored. In the adjustable machine a graduated disk is provided at the right-hand side of the frame, by means of which the machine may be set for boring at any desired angle. The machine is very simple in all its parts, thoroughly made and well adapted for the special purpose in view.

Amidon's Eclipse Ratchet Brace.

Amidon & White, Buffalo, N. Y., have recently put on the market the article named above, the construction and special features of which are illustrated in the accompanying cuts, Fig. 13 giving a general view of the brace, and Fig. 12 giving sectional

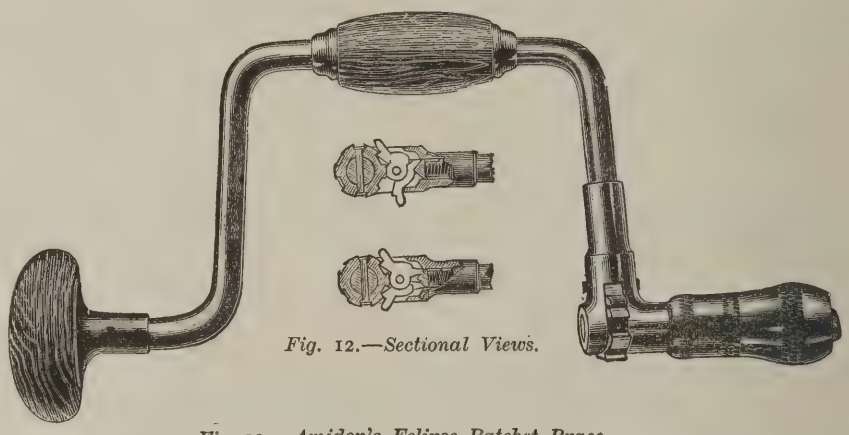


Fig. 12.—Sectional Views.

Fig. 13.—Amidon's Eclipse Ratchet Brace.

views, showing the arrangement of the ratchet. The chuck that holds the bit is connected with a ratchet wheel, to control which there are two dogs, as shown in the smaller sectional cuts, Fig. 12. These dogs are operated by a spiral spring terminated with a pressure-block which keeps them in the desired position, causing them either to press on the ratchet wheel, or holding one of them back from it. One of the sectional views shows them both pressing against the ratchet-wheel, thus making it immovable, and rendering the brace suitable for use where the ratchet feature is not desired. One or other of the dogs can be withdrawn from the ratchet-wheel, as shown in Fig. 12, when the brace is a right or left hand rachet brace, according as it may be set. When one of the dogs is thus drawn back, it will be observed that it is held back by the action of the spring above referred to. This adjustment of the dogs is obviously easily made by the thumb or finger of the operator. The manufacturers call attention to the advantage there is in having the dogs stand back of the rachet-wheel instead of at the side, as in other braces, making it, it is claimed, much stronger. They also allude to its simplicity, and the fact that it has no objectionable projections that can interfere with its use. This article is put on the market with special claims as to its desirability. It is made with 8, 10, 12 and 14-inch sweep.

Wheeler's Saw Set.

Fig. 14 of the engravings represents Wheeler's patent saw set, manufactured by William Johnson, of the Hedenberg Works, Newark, N. J. The article, as will be seen by the engraving, is very simple in its parts. The gauge is fastened to the lower jaw, while the set, which is adjustable, is attached to the upper jaw. Three sizes are manufactured—one for the ordinary hand and panel saws used by carpenters, and also suitable for band saws and small saws in general, another for cross-cut saws, and a

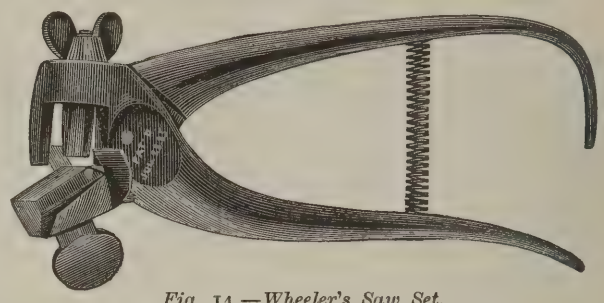


Fig. 14.—Wheeler's Saw Set.

large size for mill, circular and other saws. The maker claims that this saw set is superior to others in the following points: It will set a saw after it is filed without injuring the teeth. In use the tooth is set over the side of a piece of Stub's steel wire, which is let into the lower jaw and not over a sharp angle with the blade of the saw. Accordingly, the teeth are not broken. The contact of the parts is such that the points only are set, and not the saw blade. For these reasons it is claimed that the saw will run smoother and longer than when set with any other device.

Lateral Adjustment for Plane Bits.

The Stanley Rule and Level Company, of New Britain, Conn., and New York office at 29 Chambers street, are directing atten-

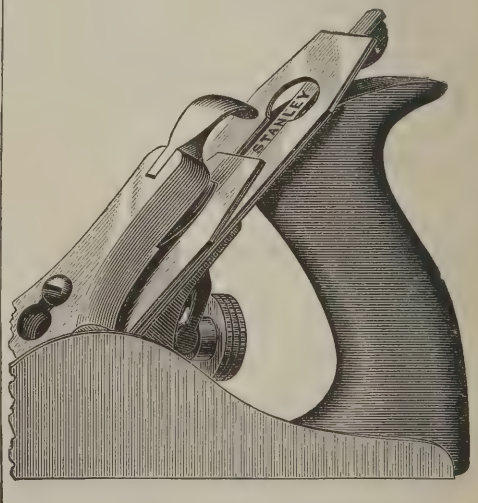


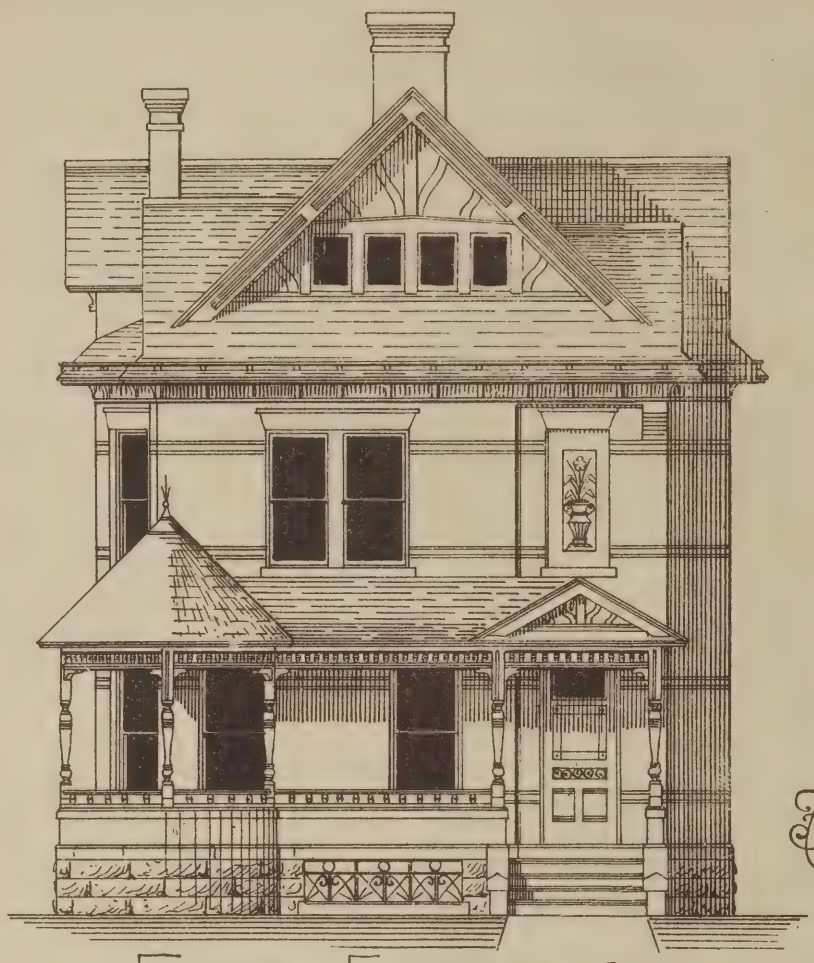
Fig. 15.—Stanley's Lateral Adjustment for Plane Bits.

tion to a new attachment for adjusting plane irons sideways for the purpose of setting the cutting edge exactly square with the face of the plane. The attachment is illustrated in Fig. 15 of the engravings. The lever just under the plane iron enables the workman to regulate his cutter, and to

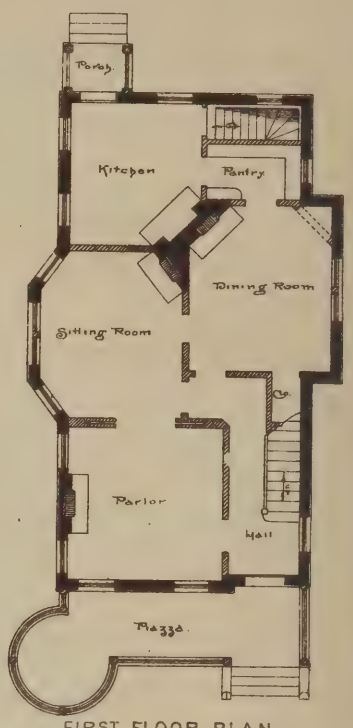
VULCAN.

EXECUTED IN SHEET-METAL BY BAKEWELL, & MULLINS, SALEM, OHIO.

PLATE X.



FRONT ELEVATION.

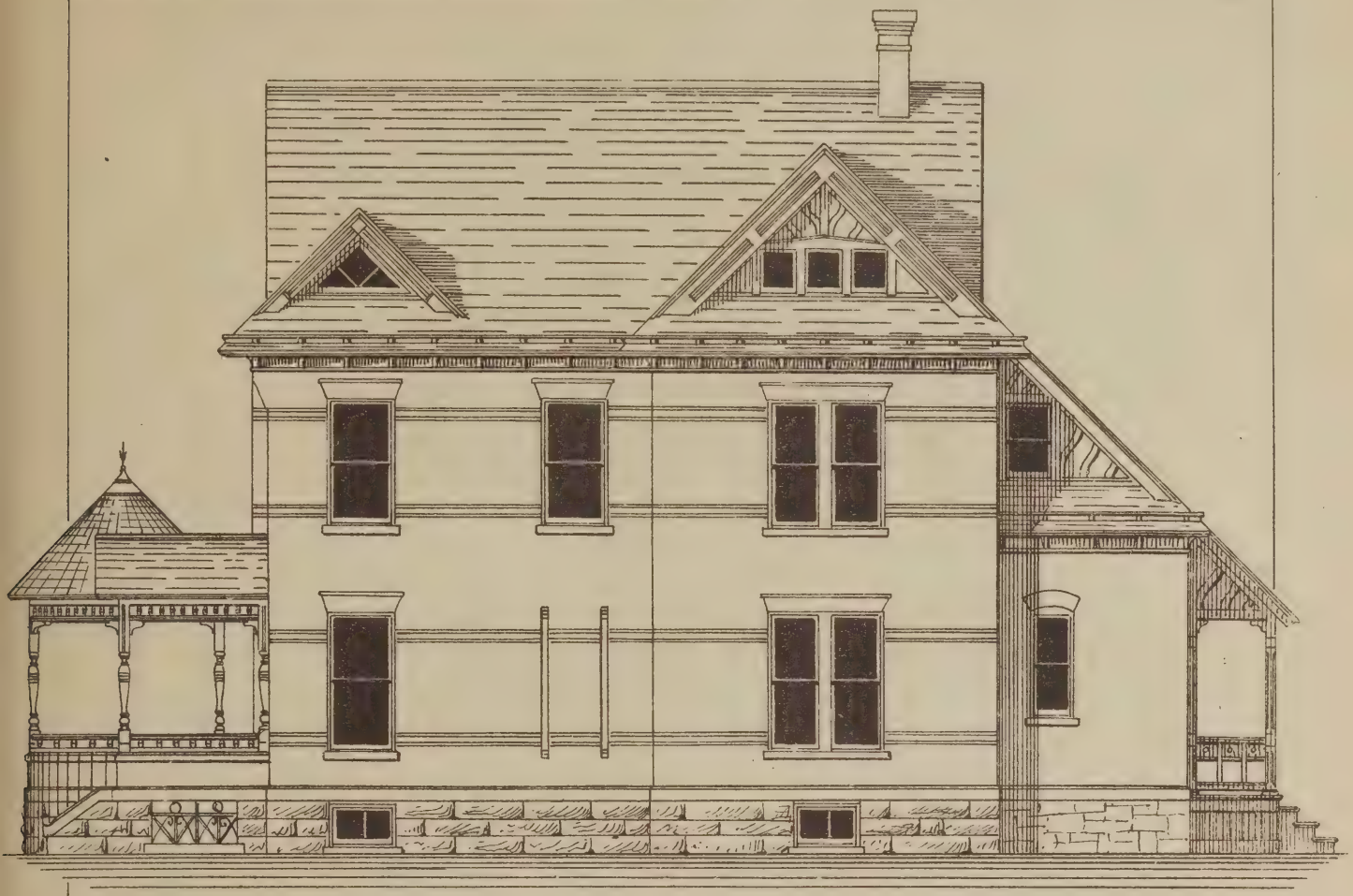


FIRST FLOOR PLAN.

SEVEN ROOM HOUSE IN BRICK.

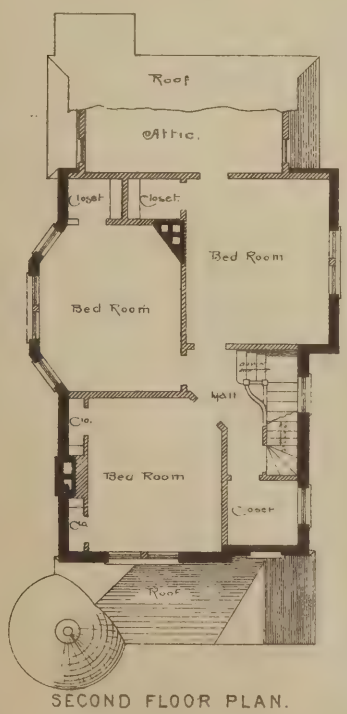
SIDE ELEVATION. [LEFT.]

PLATE XI.



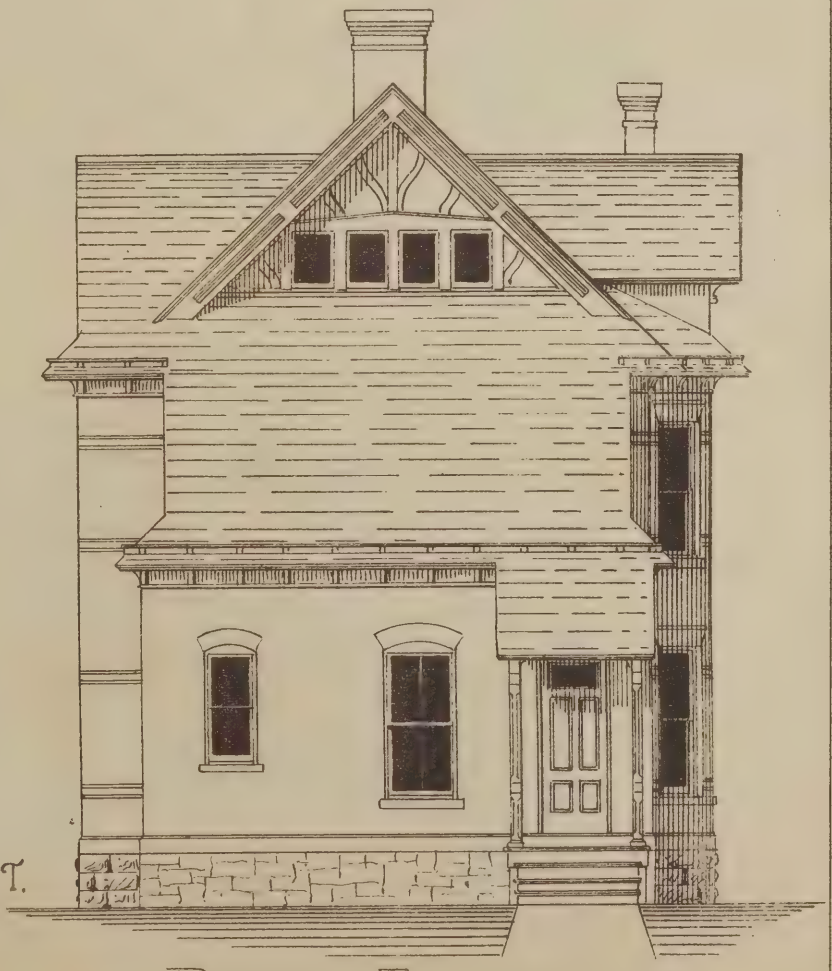
SIDE ELEVATION. [RIGHT.]

SCALES:
ELEVATIONS ⅛ INCH TO THE FOOT.
PLANS 1/16 INCH TO THE FOOT.



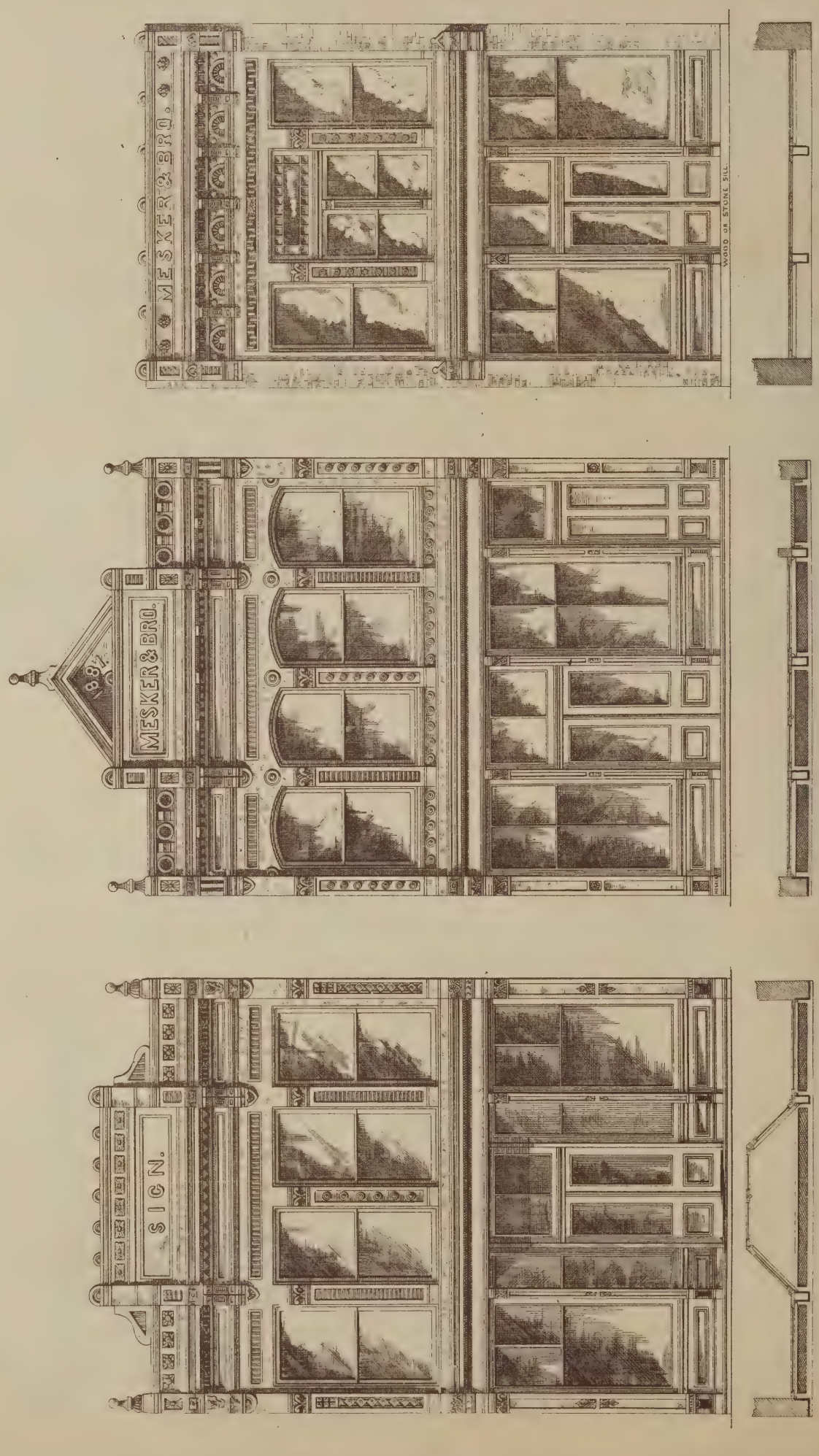
SECOND FLOOR PLAN.

F. J. GRODAVENT, ARCHITECT.
WICHITA, KAN.



REAR ELEVATION.

PLATE XII.

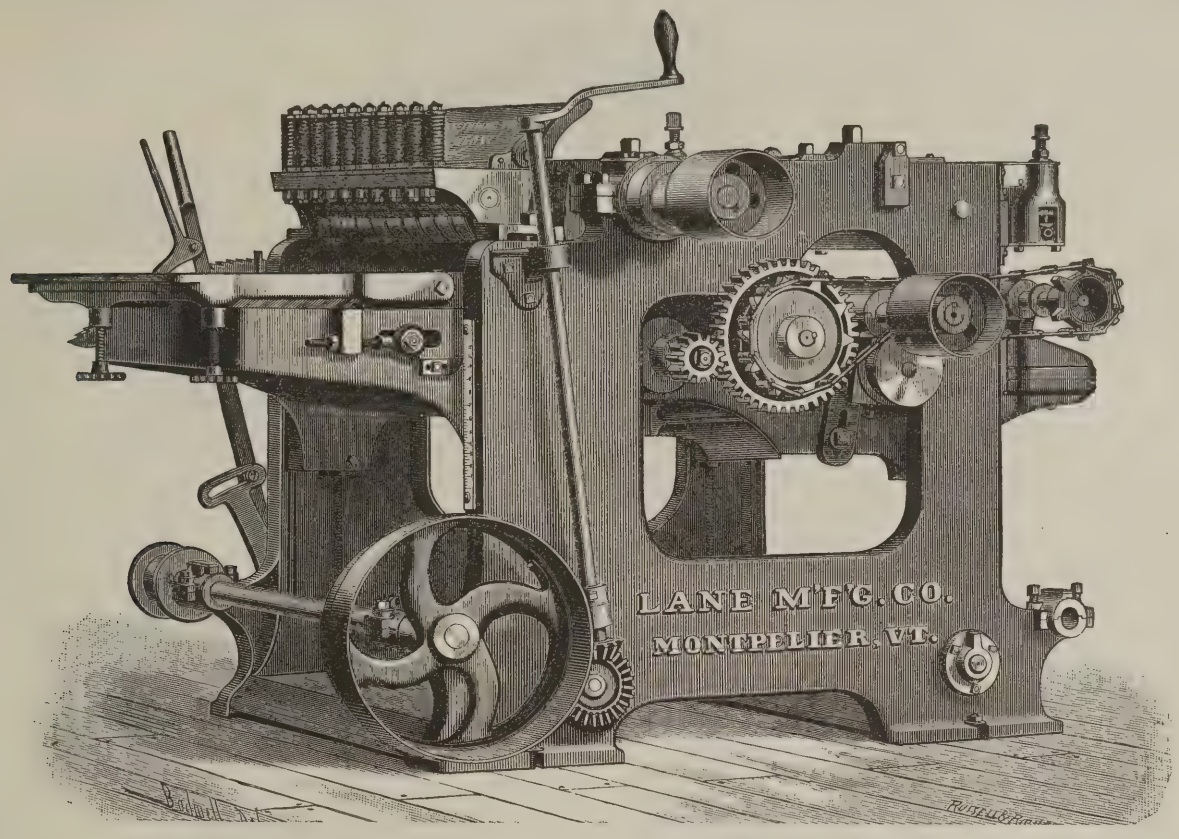


STORE FRONTS WITH GALVANIZED IRON FINISH.— SCALE ⅛ INCH TO THE FOOT

set it as may be desired by the nature of the work to be done, or the way in which the bit has been ground. This is so arranged as to be out of the way for the other adjustments which are provided on the better

to get out of repair. The cylinders are made from steel forgings—the triangular part and bearings of arbors being forged in one solid piece. Both cylinders carry three knives and run in bearings lined with phosphor

hinged so that it and the feeding out rolls can be swung out of the way whenever it is necessary to have access to the lower cylinder. A patent sectional roll is employed, by the use of which a number of boards of



Novelties.—Fig. 16.—Traveling Bed Double Surfacer.

class of iron plate at the present time. We understand that this device for side adjustment is attached to all the Bailey iron planes and Bailey wood planes shown in the catalogue of the company with two or three minor exceptions. The improvement is one that will be very generally appreciated by mechanics.

Traveling Bed Double Surfacer.

The Lane Mfg. Company, Montpelier, Vt., have recently prepared entirely new patterns for a heavy double surfacer which has been designed so as to overcome certain ob jections that have prevailed in previous machines of its class. The frame is of the most approved pattern, with web sides. The heavy ribbing around the edges and openings in the frame and all the springs and braces are inside, this giving the machine a very neat appearance. It is illustrated in Fig. 16 of the engravings. All the bosses on the frame, to which braces or cross pieces are fitted, are machine planed, and the braces are squared off in a lathe or on a planer. By this means the manufacturers assert that great strength and firmness are secured without an unnecessary mass of metal. The arrangement for raising and lowering the bed is peculiar to this machine. Four raising screws are employed—one at each corner. They are connected by means of gears and endless chains, so that all work simultaneously by one crank. This is placed within easy reach of the operator. The raising screws work in composition nuts, which are so arranged as to be easily replaced when worn. The plan of raising the bed at the corners overcomes one of the greatest objections to double surfacers, which is the cramping and binding of the bed in ways, and the excessive wear of the ways in which the bed slides when it is being raised and lowered The machine is fitted with feeding out rolls which feed or carry the lumber completely out of the machine. These rolls are revolved by means of link-belt or endless chains, instead of heavy gears and expansion gearing. The power necessary to run the gearing in other machines is saved, and the machine, it is claimed, is made more simple and less liable

babbitt metal. The upper cylinder, which takes the heavy cut in surfacing or reducing lumber to a desired thickness, is belted at both ends. The under cylinder, which takes a light surfacing cut, is belted at one end only. Both are driven from a double adjustable countershaft standing on the floor just back of the machine. The ways over which the traveling bed passes are made separate from the bed and can be replaced when worn without sending the machine away. The traveling bed and lower cylinder are fitted into one frame or bed casting, so that the under cylinder is raised or low-

different thickness can be planed to one thickness by running them once through the machine. The advantage of this device will be particularly appreciated in box shops where sidings are used, and also where the lumber from a number of mills is being surfaced. The machine is covered with a hinged bonnet which folds back to give access to the working parts.

New Hand Planer and Jointer.

The Cordesman Machine Company, of Cincinnati, Ohio, are directing attention to a new 16-inch hand planer and jointer, with

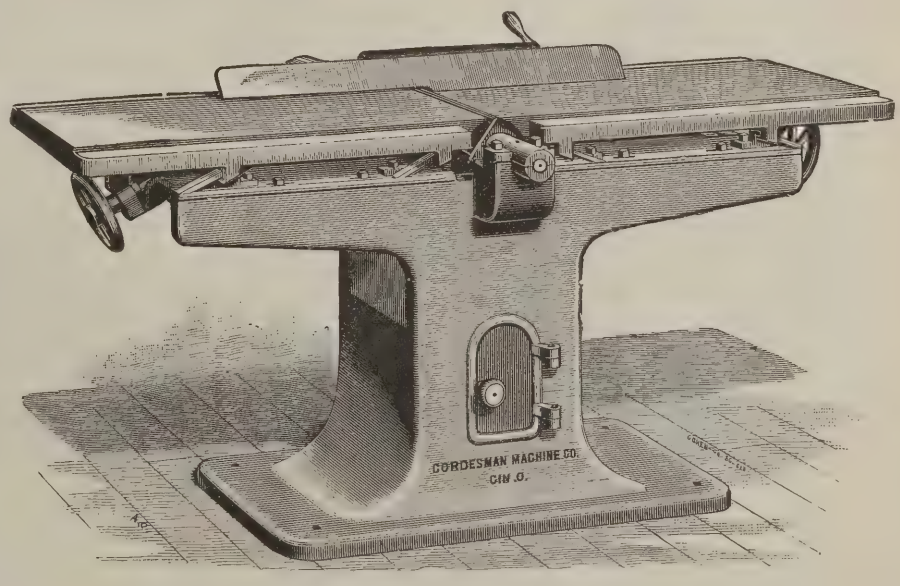


Fig. 17.—New Hand Planer and Jointer.

ered with the bed. Accordingly the under cylinder needs adjusting only when the knives are removed or changed. The lower cylinder, the tables in front and back of it, and the bed above it are adjustable independently of each other. The table at the rear end of the machine is

patent adjustable fence, which is illustrated in Fig. 17 of the engravings. The makers inform us that this machine has been designed to take the place of the old Daniels planer. It can be used to plane out of wind. It will make a perfect glue joint, and will chamfer and bevel. The makers assert that

for truing-up heavy timbers it has no equal. It is a valuable machine for furniture, chair, wagon, carriage, sash, door and blind factories, and also for establishments devoted to the manufacture of agricultural inplements. It is made in six different sizes, ranging from 8 to 30 inches in width. The frame is heavy in character and is of one piece of casting. It is designed in such a way as to be well braced, and is provided with a wide base, making a good floor support and overcoming all vibration. The column of the frame is fitted with a door, thus providing a closet for the reception of small tools, knives, &c. The tables are made of good length, measuring over 6 feet from out to out. Each table is adjustable vertically and laterally, to and from the head. The inclines are so arranged that should the tables get out of true by accident or otherwise, they can be readily adjusted. The fence can be angled to any bevel. It can be used on any part of the table, and the full width of the machine can be used without removing the fence.

New Outside Molder.

C. B. Rogers & Co., Norwich, Conn., with warerooms at 109 Liberty street, New York, are directing attention to a new 6-inch outside molder, illustrated in Fig. 18 of the engravings, which they inform us is built from entirely new designs, and is complete in every detail of construction, and perfect in all its adjustments. The frame, which is heavy, is plain on the outside, and ribbed on the inside, and is long enough to give ample belt-power. The upper and lower arbors, as well as the side spindles, are made of the best quality crucible steel. The heads are of steel, and are slotted on four sides. The top head with yoke and spindle are supplied with lateral adjustment for lining to the cut. The pressure bars and chip breakers are all adjustable to and from the cutters, and the pressure bar over the lower head is arranged to swing back from the bed, as is also the toe piece at the end of the machine, to admit easy access to the cutters on the lower head. The bed of the molder is raised and lowered by means of a screw and hand wheel, and will drop to 14 inches below the cut. It is secured in position by two bolts, with hand wheels at both ends of the bed. The feed is said to be very strong. Both upper and lower rolls are driven, and four changes of feed are provided. The makers inform us that the machine has every necessary and convenient adjustment for sticking a full line of moldings. The circular which the firm have issued gives particulars of speed of pulleys, &c.

Boring and Mortising Machine.

P. Pryibil, corner of Fortieth street and Tenth avenue, New York, has brought out the two-spindle boring and mortising machine shown in Fig. 19 of the engravings. This machine has been designed to perform with accuracy and in one operation that class of work in which two holes are to be bored at a distance and at a different angle as in doweling. The two spindles are mounted on an adjustable head, which enables them to be set at any angle from the horizontal to the vertical, where one would be over the other, and to any distance between centers from 1 inch up to the extreme range of the machine, according to the size employed. The small machine, we understand, has a range in this particular of from 1 to 5 inches, and the larger size from 1 to 16 inches. The table has a vertical movement of 12 inches, and when ordered for mortising is provided with a side movement also. Adjustable stops are furnished for determining the extent of these motions. The mortising is done with a revolving cutter, cutting on both side and end, producing, when the work is moved sideways, a mortise with half-round ends. When only one

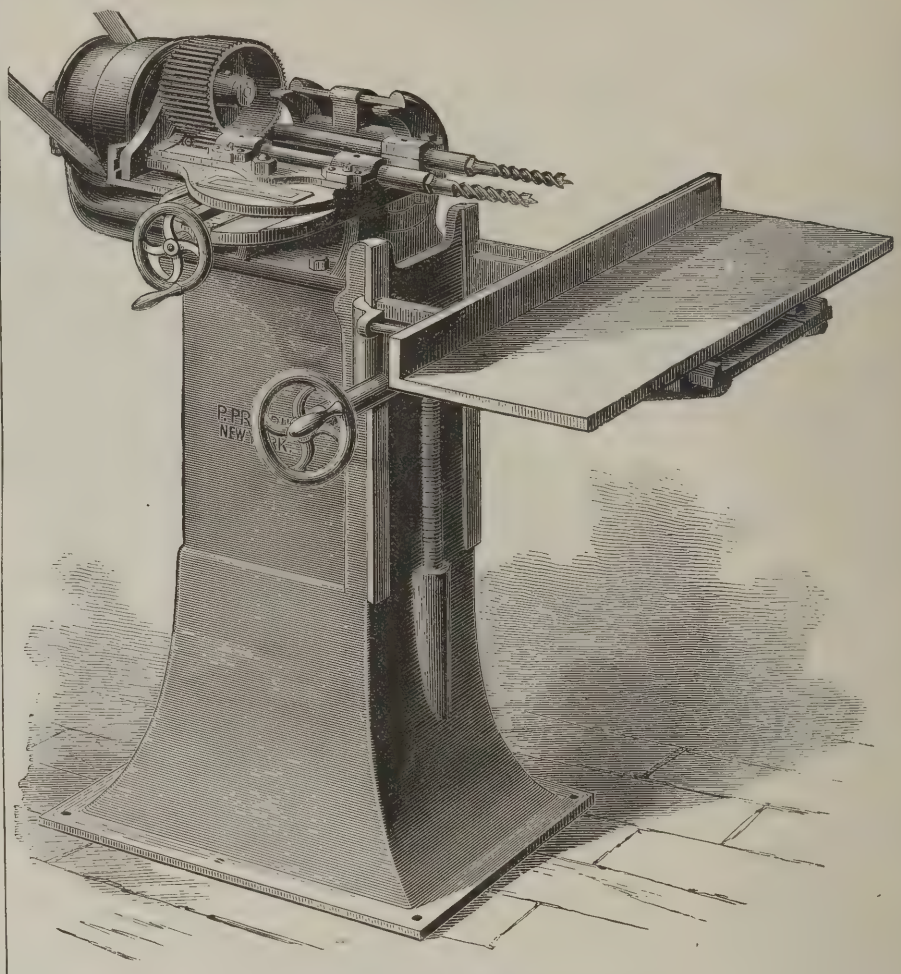
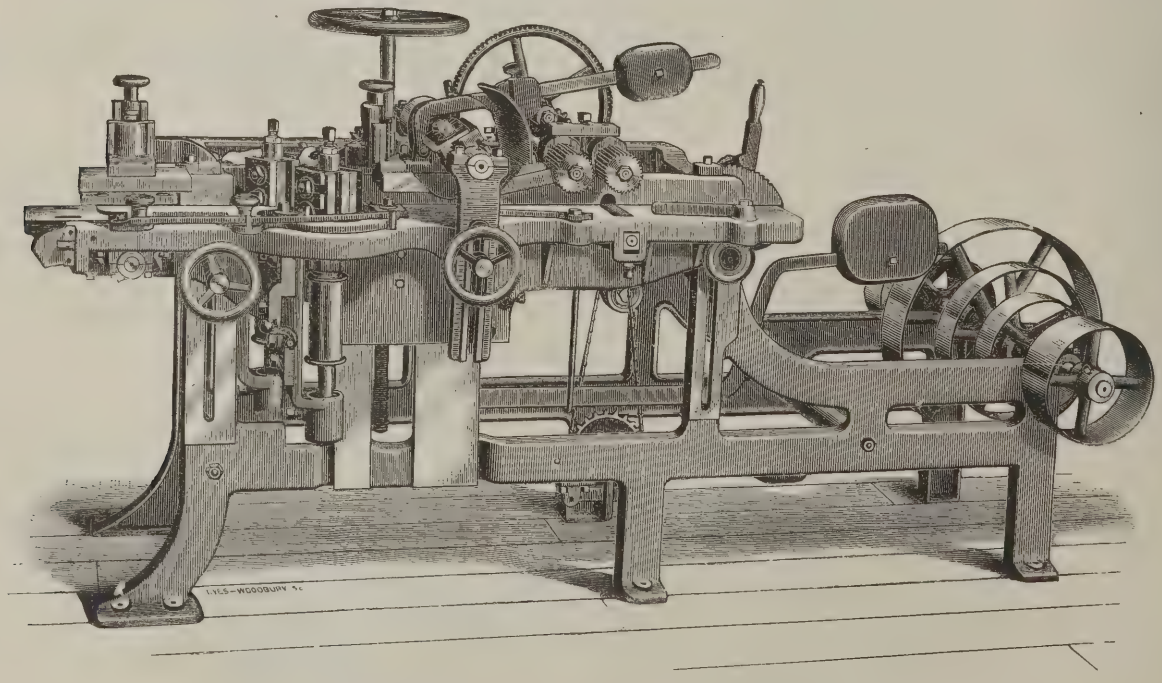


Fig. 19.—New Boring and Mortising Machine.

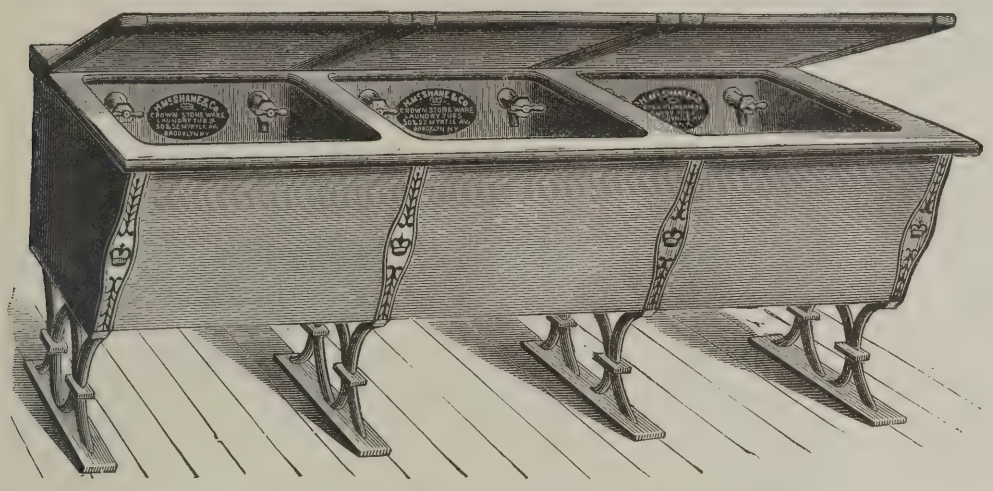


Novelties.—Fig. 18.—New 6-Inch Outside Molder.

spindle is to be used, it can be disconnected from the large gear wheel, by loosening and drawing back the work which supports it. A circular has been issued by the manufacturer giving directions for use, the speed at which the counter-shaft is to be run, and other particulars

Stoneware Laundry Tubs

Henry McShane & Co., Nos. 50 and 52 Myrtle avenue, Brooklyn, are putting upon



Novelties.—Fig. 20.—McShane's Crown Stoneware Laundry Tubs.

the market a line of goods known as the McShane Crown Stoneware Laundry Tubs. A view of one of these is shown in the accompanying cut. In the illustration the tub is shown supported upon iron legs. These are furnished either galvanized or painted as may be required. It is also shown with a top cover, which is preferably manufactured of ash wood. The tubs are also supplied with ash frame and legs. The article is offered to the trade as being infinitely superior to the wooden washtub, and at the same time as cheap as wooden tubs are ordinarily supplied. Each tub is of one piece, supplied with all necessary openings for water connections. We have examined fragments of the material out of which this tub is made. It is very solid in its general structure, the particles closely adhering and the surfaces being worked in such a way as to present a smooth finish, and one through which no water can percolate. Several different sizes and styles are manufactured. The makers inform us in their circular that they guarantee these tubs to outlast other styles, and to be specially superior to those known as cement or soapstone. They are white in color and have the special advantage of possessing no joints. The statement is made that they will not break from heat or from sudden changes with hot or cold water, nor from dropping heavy articles into them. The inside corners are rounded, and the bottoms are formed so as to drain off the water quickly.

Chicago Gas Machine.

There is a demand in various directions for private gas apparatus either for supplying dwellings with desirable illumination or for furnishing factories with means of light, and also fuel for use in connection with different mechanical operations. Knisley & Miller, of Chicago, in order to supply this demand, are announcing what is known to the trade as the Chicago gas machine. They inform us that they are prepared to send builders the plans and specifications of this article, and to otherwise co-operate with them in arranging for the use of the apparatus. The gas machine uses gasoline as the crude material and is arranged to take the supply of fluid in the most convenient manner, and so as to require a minimum of attention in use. In a circular which the firm have issued, two plans for using the apparatus are suggested. In one case city gas is used as a means for obtaining the necessary pressure, and in the other a blower is employed. The latter is operated by a weight with the usual form of escapement. In either case gas is manufactured only so fast as it is consumed. Where city gas is employed for pressure, the resulting product is simply city gas enriched. Of course, under these conditions the saving in gas as compared with the prices charged by city gas companies is not so great as where the gas is manufactured outright. The apparatus is of interest to architects and builders who have occasion to add appliances of this kind to the equipment of their buildings.

Manhattan Door Check.

A device for preventing the slamming of doors that is being put upon the market by the Brady Mfg. Company, York and Washington streets, Brooklyn, N. Y., is shown in Fig. 21 of the engravings. It consists of a plate screwed to the top of a door, carrying a coiled spring shaped in the form of a staple. There is also a second plate screwed to the casing above the door, and adapted for receiving the staple-shaped wire as the door shuts. If the door is brought together gently, the wire has the effect of lifting the latch-shaped piece hung upon the second plate, and allowing the staple to pass home between the two parts. On the other hand, if the door is slammed, the effect is to bring the wire directly against the end of the lower projecting piece, and thus cause the spring to receive the force. The effect of this is to cause the door to rebound and come against the plate a second time. If it still has sufficient force to cause a slam, it will again rebound, and so continue until finally it shuts gently, and then, lifting the latch, as already described, it will pass home, as shown in the engraving. In the circular which the company have issued several reasons are given why this door check is better than air checks and other devices with which it is in competition. Among these we note the following: There is no vent to be adjusted on changes of temperature; it is impossible for the parts to catch so as to leave the door partially open; the action is quick; the door opens as easily as though there were no check in place, and the device can be applied to any door whatever.

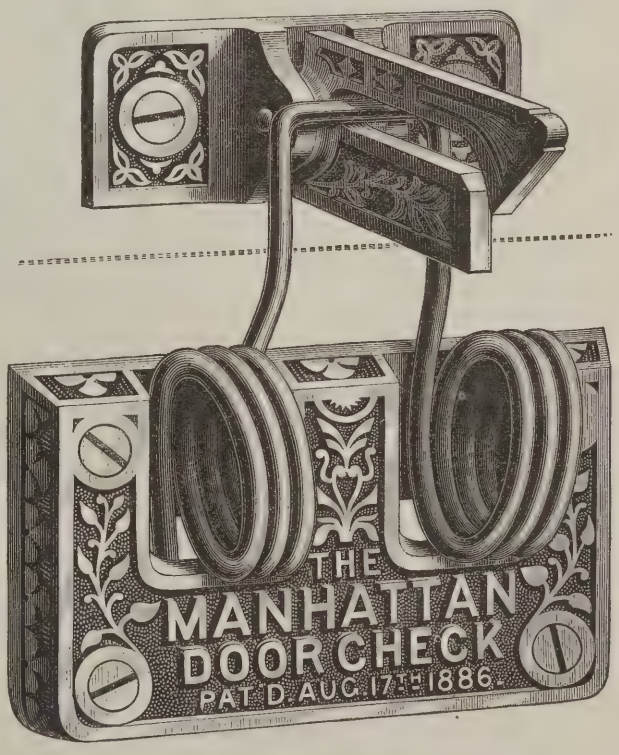


Fig. 21.—Manhattan Door Check

Manufacturing Grindstones.

A correspondent of the Portland *Transcript* gives a description of a visit to the Bay of Fundy and along the shores, where the grindstone quarries are located. The superintendent of the quarry says when the tide is out his men go down on the rocky shore and work out near the water. At low tide the men on the shore drill some holes in the ledge, put in powder and blast out great pieces of rock. When the tide rises again they float out some big logs and empty barrels over where the loosened rocks are. When the water goes down again they fasten a big rock to the raft with heavy chains, so when the tide again rises it lifts up the raft and the rock with it. Then they tow it as near the shore as they can. If it is the right kind and size for a millstone sometimes it is allowed to lie there until the workmen, with stone chisel and hammer work it into the proper shape. At other times, by means of a derrick, it is drawn out on the wharf. Then it is rolled on a track and hauled to the factory. At the great stone factory the large piece of rock is placed on a carriage, and, with a saw similar to the up-and down saw in a mill, the rock is sawed into great slabs of the right thickness for the grindstone. The saw does not have teeth, but wears its way through the rock with the aid of sand and water, which are continually poured on. Then the slabs are taken, a hole made in the center, the edges trimmed off with a chisel, and the whole placed on a kind of lathe, turning it until it is true and the edge smooth. The rock from which the grindstones are made is a kind of sandstone, and there is a great difference in the "grit," some being coarse and some fine. Often several different degrees of "grit" are found in the same quarry. There are many quarries along the shores of the Bay of Fundy. The reason stone is taken from under the water, when there are many quar-

ries a little distance from the shore, is because the best stone comes from the bottom of the bay, where it is covered at high tide.

The Apprenticeship System.

In the fourth annual report of the Bureau of Statistics of Labor of New York, the commissioner says:

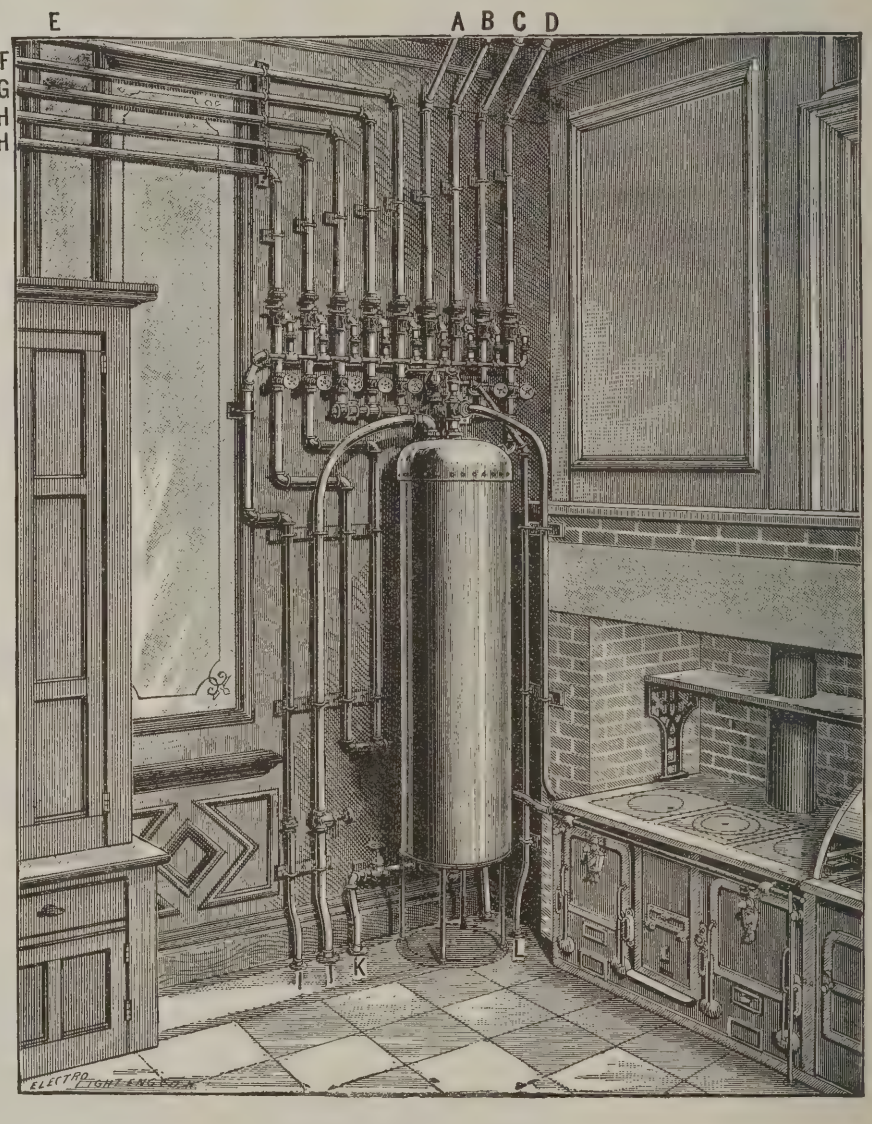
As a very prominent feature of the labor question, it has been found expedient and necessary to look into our apprenticeship system—the means at hand of renewing and perpetuating our labor supply. The broad result is that we are largely dependent upon foreign skilled labor. Our supply of native mechanics is daily augmented by the skilled labor of Europe, and while this foreign element is not equal to the skilled labor which is retained in Europe it is in the main vastly superior to that produced in our own country. Whether unrestricted immigration be or be not a national blessing may be disputed, but a visit to the workshops of the State will demonstrate the truthfulness of the statement that the large majority of our tradesmen and mechanics are foreigners. Indeed, in many trade and industrial estabments there is not a single American at work. Nearly all positions of trust and responsibility in the mechanical departments are in the hands of foreign-born workers and most of the boys and young men learning trades are either foreign born or the sons of foreign-born workers. And the opinion is now very generally expressed and accepted that most of the labor troubles of the last few years have been precipitated, not by whole trades, but by sections of them, and that these sections were largely controlled by foreigners, or natives who had from association imbibed foreign ideas on the labor question.

The Commissioner then discusses the American objections to apprenticing boys and the consequent failure of American labor to prevent such a state of affairs as is mentioned above. He argues in favor of manual training as a means of keeping up the supply of trained labor and preventing the coming man from becoming the slave of the machine.

Kitchen Boiler Connections in Residence Near Dobbs Ferry, N. Y.

The accompanying illustration shows the plumbing work in the kitchen of Cottinet House, which is being erected on the property of Mr. Cyrus W. Field, at Ardsley Park, near Dobbs Ferry, N. Y., for his son-in-law, Mr. D. A. Lindley. Ardsley Park is a tract of about 1000 acres of land on which Mr. Field is expending a considerable amount of money, and on which about 150 dwellings (40 of which are first-class residences) have been already erected. Sewerage, water, gas, steam, heat and all modern conveniences are available, and shops connected with every branch of building and sanitary interests are established on the property, with superintendents over each trade or department who are skilled mechanics in their respective fields of work. The chief source of the water supply is an artesian well 600 feet in depth. The water is pumped by means of a Knowles patent deep well pump with a capacity if needed of 500 gallons per minute. The water in its passage to the reservoir is filtered through a Loomis patent 3-inch water filter, fitted with valves to clean and filter without any stoppage, while the reservoir is capable of holding 400,000 gallons. In addition to the artesian well there are two lakes on the property, the water of which is well adapted for domestic use. The pressure at which the water is capable of being delivered is nearly 150 pounds, and has to be reduced before entering the buildings by means of a Ross pressure-valve to 35 pounds. The sewerage system is fully up to the best sanitary requirements, extra heavy iron pipe 6 inches diameter being used, and when laid under cellar floor is furnished at every 10 feet with cleaning screw.

The plumbing-work in the Cottinet House has been planned and carried out without regard to expense. There are four bath-rooms, and the supply-pipes are so arranged that the water can be turned off and the hot pipes emptied from any one of these without interfering with the others. The baths, water-closets and basins are all controlled by stop-cocks and trapped and ventilated in the most approved manner, while under one of the basins in the second story there is a lead lined box in which stop-cocks are located to shut off the hot and cold water from bath-rooms situated in the front of the building and completely emptying the pipes in the event of their not being used. Referring to the illustration it will be noticed that the kitchen boiler differs from those in ordinary use, in that the return-pipe from water-back enters at the top, instead of by a side coupling. The object of this is to secure a direct supply of hot-water if needed to the upper floors. On the top of the boiler there is an arrangement



Kitchen Boiler Connections.

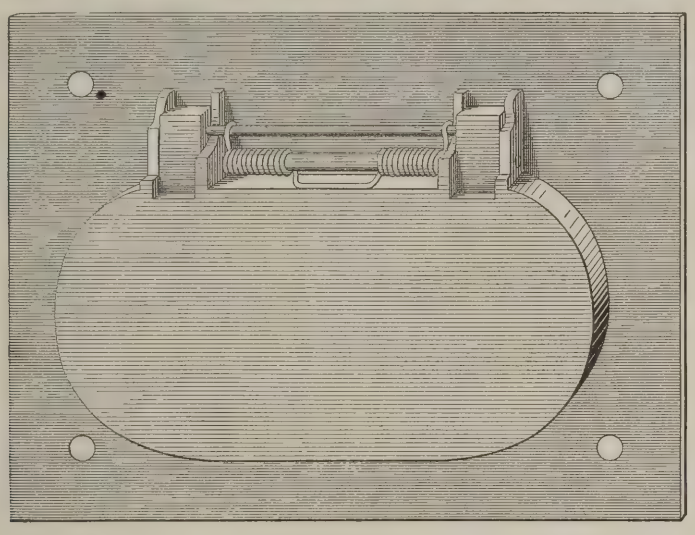
of 1¼-inch pipe in the form of a cross, into one arm of which the hot-water circulation-pipe from water-back enters, the water immediately passing through the other arm into a "header" or horizontal reservoir, to which are attached the six hot-water pipes (marked A, B, C, E, F, G), and to the upper part of this cross the safety valve is fastened. These pipes after being carried up the kitchen wall branch off in two sections. The pipe marked A is the hot-water supply to the kitchen sink. B is the circulation pipe between the kitchen and laundry boilers in the basement, while C supplies hot water to a bath-room in the northeastern part of the house, and D is the cold-water supply. The pipes E, F and G supply hot water to the north, east, and south bath-rooms respectively, while H, H indicate the circulation pipes. The cold-water supply to the boiler is through the pipe J. Immediately above the boiler is a horizontal drip-pipe, through which any or all of the pipes can be emptied whenever necessary. This operation is performed by closing the valve (shown just above the boiler) of any particular pipe, or of the entire set, and opening the pet-cocks attached to the pipes and to the drip-pipe. The water thus drawn off being discharged through the pipe I, which extends into the cellar, where it is connected with the cold-water supply pipe to boiler (J). The pipe marked K is the sediment pipe for emptying the boiler, and L in the emptying-pipe from safety valve. This entire system of piping is so constructed that, by means of the unions above the pet-cocks as shown, any one pipe or the entire set can be removed without disturbing the rest; and, from the fact that all the pipes are passed through walls and ceilings by means of escutcheons, it is only necessary to make detachments at either side to withdraw the pipe. Besides the kitchen boiler, there is another boiler in the laundry in the basement connected by means of the circulating-pipe B, and so arranged that should it be necessary for any reason to dispense with the kitchen boiler, that in the laundry can be made to supply hot water to the upper floors. In either case it is claimed that by the direct system adopted, hot water can be supplied to the bath-rooms within 30 minutes after lighting the fire in the range. The kitchen and butler's pantry sinks have patent grease traps, and every fixture is supplied with lead safe with separate pipe to sink in cellar.

The system of piping represented is of galvanized iron fastened to wall with brass pipe bands, and the pipes are to be finished off in silver bronze. The entire work has been planned and executed by the superintending plumber on the estate, Mr. Peter J. Carpenter, a former apprentice and workman of Messrs. Locke & Monroe, in whose service he spent 16 years.

CORRESPONDENCE.

Tool Chest Handle.

From S. H. W., *Bridgeport, Conn.*—Some time since one of the readers of *Carpentry and Building* asked concerning a tool chest handle that would not drop down, and thus get broken when the chest was dropped on end, as is generally the case when handled by the average baggage smasher. Having lost three or four handles from my chest at different times, I set about to devise a plan

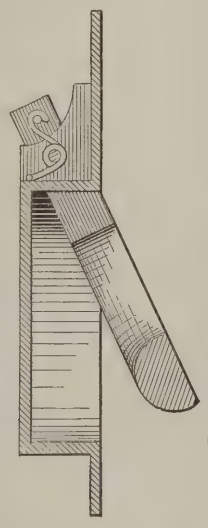


Back View of Tool Chest Handle Plate, Described by S. H. W.

which should save their successors. I hit upon the expedient of applying a spring to the back of the handle, which seems to answer the purpose admirably. A piece of piano wire 6 or 8 inches long, a small drill to make holes in the ends of the handles, and a little ingenuity are all that is required. I inclose a sketch of the handle as it is arranged on my chest, which I think will sufficiently explain itself.

Strength of Floors.

From J. C. M., *Collins, Wis.*—I have taken and read *Carpentry and Building* since its publication, and now I come asking a favor. I wish to inquire as to the safety of a floor in a public hall. Could enough people get in the building to break the floor down? It is the second floor, over a room of the same size. The room is 28 x 36 feet; joist 28 feet long, 2 x 14 inches, set 16 inches from centers, and trussed on both sides, with 1 x 6 inch fencing, starting at the lower edge of joist at the ends and meeting at the upper edge of joist in the center, well nailed with 10d. nails. It has two rows of bridging, making the space between bridging about 9 feet. It has a double floor of 1 x 6 inch jointed flooring. I would be glad to see an answer from the Editor in the March number; also to have the letters published for an answer from practical mechanics, if any should feel interested in the subject.



Vertical Cross Section Through Handle.

Answer.—The question asked by our correspondent, "If enough people could get into the building to break the floor down," is somewhat difficult to answer, as there are so many structures erected throughout the country wherein all mechanical laws are set at defiance that the calculating observer is apt to attribute their continued existence to the intervention of a special act of Providence. Our correspondent's floor with joists 28 feet long, 2 x 14 inches, set 16-inch centers, and leaving the fence-board trussing out of the question, would sustain a safe load of about 50 pounds to the square foot, including its own weight. The weight of the double floor, joists and lath and plaster ceiling would be not less than 20 pounds per square foot, leaving 30 pounds per foot for load. A crowd of people closely packed will weigh from 75 to 100 pounds per square foot if they keep still; 125 pounds per foot is the load usually calculated for in public buildings in order to allow for the vibrations caused by people in motion, and which materially increase the strain on the floor. To load this floor with 125 pounds to the square foot would be bringing the load up to the full capacity of the joists, and it would be liable to go down at any time. Our correspondent fails to state what material the joists are composed of, but we presume it is either hemlock or white pine.

Now, as to the strengthening properties of the board trussing, the joists are of soft wood, the 6-inch fencing presumably of soft wood also, and the nails joining the two pieces, being in single shear, will not stand a very great strain. The side pieces are generally nailed on before the joists are put in position, consequently they receive a strain as soon as the joists are turned on edge, as a joist the length of those under discussion will deflect with its own weight. With the load already calculated of 30 pounds per square foot, the joists will deflect about an inch at the center; consequently the whole weight of the load will come on the trussing before the joist begins to bear anything, the joist in this instance only acting as an agent for transferring the strains of the load to the trussing. At 50 pounds per square foot, the weight of the floor and safe load combined, there is a load of about 1850 pounds on each joist; half of this load, 925 pounds, is distributed on each side of the center. Now, owing to the almost horizontal position of the trussing, a load of 462 pounds at the center would cause a compressive strain of 12,950 pounds in the two pieces of trussing at one end of the joist which we have under consideration. To take up this strain and communicate to the joist we have an indefinite number of 10d. nails. Careful experiments have shown that from 300 to 400 pounds is the ultimate shearing strength of a 10d. nail driven in wood in single shear, and if we allow 100 pounds strain to each nail, which is too much, it would require about 650 nails in each piece of fencing to take up the strain, or nearly 40 pounds of nails for the four pieces. Now, this would be a safe enough calculation for a load of 30 pounds per square foot in addition to the weight of the floor, but a greater load would deflect joist and truss together; double the load and the nails would certainly bend and crush the fiber of the wood. And the worst feature of this style of construction is that, being once deflected, it has no elasticity to enable it to return to its normal position. It must be made with a large margin of safety to enable it to resist all attempts at deflection, or its usefulness is destroyed. We would advise our correspondent not to trust to the bracing, but to put in good, honest posts and girders below the floor. They may be inconvenient, and not look quite so well as the unencumbered space, but it would be far better to endure the inconvenience than to try and remedy it by such makeshifts, and thereby endanger the limbs and lives of an unsuspecting public.

Corrugated Iron for Roofing.

From THE CINCINNATI CORRUGATING COMPANY, *Cincinnati, Ohio.*—We note in the February issue of *Carpentry and Building* an article entitled "Quick Church Building," and in the latter part of it are some remarks regarding the roofing, wherein it is suggested that the corrugated roofing would be open to objection through its susceptibility to penetration by snow, and that it would be hot in summer, especially at the pitch indicated in the article. From our experience we are confident that there would be no trouble in regard to the penetration of the snow, as the interstices thereof would be in a very small proportion as compared with shingles, and would thereby be within the limits of even an ordinary workman's attention in laying. There is no doubt but that the iron itself would be hot in summer, but that would be of small consequence, as the heat would not be sufficient to melt the iron. There is no danger of the heat penetrating to the inconvenience of the congregation by the use of corrugated iron. You will perceive this readily when you reflect that the corrugated iron, especially of the large size corrugations, only touches the sheeting, which should be used in any case in a church building, at certain intervals. Between these points are spaces for the circulation of the air, which must be greatest when the iron is hottest, and it can be easily arranged whereby the hot air will escape at the highest point of the roof. This idea does not always occur to those considering the use of corrugated iron for roofing, but it is based on experience, and we claim thereby that, so far as the results are concerned, those using the corrugated iron are less troubled with the effects of heat than those using tin.

Theory vs. Practice.

From W. G. P., *Toronto, Ont.*—If the hour hand of a clock be any distance in advance of the minute hand, say, for convenience, the space of 1 foot, the minute hand, although moving 12 times as fast as the other, will never overtake it, for while the minute hand is moving over those 12 inches the hour hand will have moved over 1 inch, so that they will at the end of that period be 1 inch apart. Now, while the minute hand is moving over 1 inch the hour hand will have moved over $\frac{1}{12}$ inch, so it will still be ahead. And again, while the minute hand is passing over the space of $\frac{1}{12}$ inch the hour hand will pass over $\frac{1}{144}$ inch, so that it will still be ahead, although the distance between the two has been diminished. From this it is clear that we may go on forever, always diminishing the space between the two by a fraction, but the minute hand can never overtake the hour hand. This is what Richard Whatley called logic. We of course know that the conclusions are not correct, and therefore we draw the deduction that figures in this case must lie. My impression is that this is a hard nut for some of those calculus fellows to crack.

Note.—According to our conceptions of Whatley's system of logic, one of the first things to do is to make sure that your premises are correct, and that your chain of reasoning has no defects. When a line of argument is indulged in which brings up to such an absurd and manifestly impossible conclusion it would seem that the reflection must be against the train of reasoning rather than against reasoning in general. Theory and practice are not separated by an impassable gulf, but they remain apart be-

cause those who attempt to connect them fail to understand one or the other of the extremes, and therefore do not go at the work correctly. We are disposed to refer this question to the "calculus chaps" whom our correspondent seems to challenge. It will be strange, indeed, if some of them are not able to come to the rescue, and show that theory and practice, even in this case, are in accord, and that logic is not opposed to common sense when properly applied. Who will formulate an answer?

Construction of Brick Walls.

From F. D. R., *Cobourg, Ont.*—I am about to build a house 28 x 30 feet in plan and 19 feet high. My first idea was to build a solid 9 inch wall, stripping it with 1½ x 2 inch stuff and lathing on the strips. A bricklayer advised me to build a hollow wall having a space of 2 inches between the two courses, and to tie the two walls together by inclosed, because his description indicates the general conditions under which the work must be done. The fact that a flue leads from the cellar would seem to indicate that there would be very little difficulty in accomplishing what he has in mind. If the chimney flue referred to is large enough, and the draft sufficient to admit doing so, we suggest that a ventilating register be inserted in the flue near the ceiling of the cellar—or, in other words, above the entrance of the stove-pipe. The uptake through this flue will in all probability be sufficient to change the entire body of the air in the cellar in a very short time, and this will ventilate it in such a way that offensive odors will not be likely to penetrate the office. If this is not feasible, some other plan employing the same principle should be resorted to. By getting an ascending current of warm air drawn out from the cellar, fresh air will make its way into the cellar, and overcome the bad smell. In addition to these precautions of a mechanical nature, we would advise a thorough cleaning of the cellar and purifying it with lime.

Barn Framing.

From J. P., *Berlin, Mich.*—"H. H. B." desires some plan that is easy of construction, and at the same time strong. I inclose a sketch, Fig. 1, which, I think, will do. I have left out the cap on the purlin posts, since it would be in the way in using a horse hay fork. The long beam between purlin posts can be left out of the middle bents, and girts placed on end bents as often as needed.

From E. P., *Hanover, Mich.*—In answer to "H. H. B.'s" request for assistance in framing the cap plate of a barn frame, I would suggest that he put the cap on top of the cross beam and notch it on to the beam about 2 inches. Let the post tennon project about 2 inches through the beam. Cut it square and make the mortise to match in the cap, and bolt the cap down with ½ or ⅝ inch bolts, put in the beam before raising. In my opinion, however, your correspondent's plan

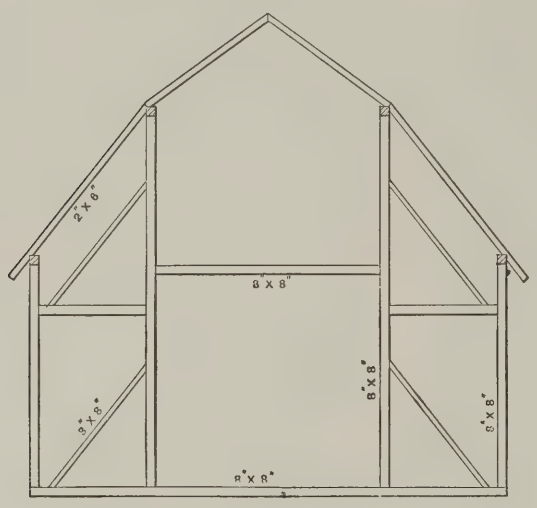


Fig. 1.—Construction Suggested by J. P.

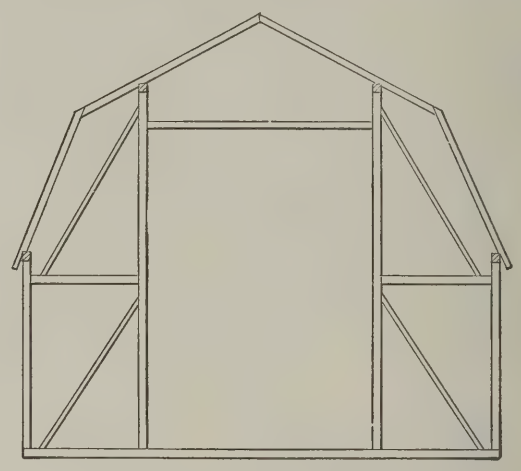


Fig. 3.—Plan of Framing Submitted by F. F.

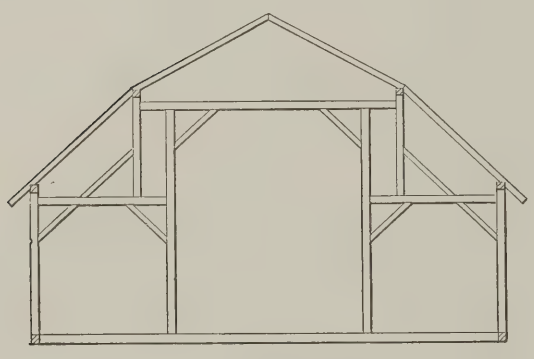


Fig. 2.—First Sketch Referred to by E. P.

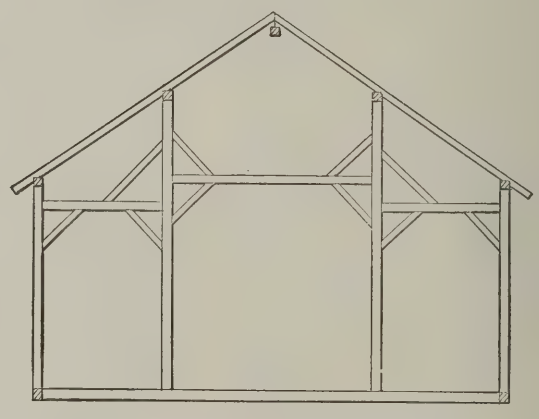


Fig. 4.—Second Sketch Referred to by E. P.

Barn Framing.—Diagrams sent in by Various Correspondents.

pieces of hoop iron, say 7 inches long, laid across the space every 6 or 7 bricks in hight and two feet apart. He advises plastering directly upon the brickwork. It seems to me the pieces of hoop iron would corrode in time and cause the wall to fall. On the other hand, I have no doubt as to the inside of the wall so built being quite dry. Will some of the practical readers of the paper favor me with a reply on these points?

Ventilating a Cellar.

From H. M., *Chatham, Ont.*—Will you please explain how I can ventilate a cellar so as to keep the foul air from going up to the front of the office. The sketch I inclose will show you how the office is located on the first floor above the cellar. The building is three stories in hight, and a flue in the wall runs from the cellar to the top of the house. This flue is used in connection with a stove in the cellar.

Answer.—It has not seemed necessary to engrave the sketch which our correspondent

The Success of "Carpentry and Building."

From W. P., *South Boston, Mass.*—I congratulate you most heartily on the grand success which you have achieved in publishing monthly that magnificent publication, *Carpentry and Building*. Its elevations, plans and details are such as to be of incalculable value to all mechanics engaged in the house-building line. To my mind it surpasses all other publications of its kind in this country in the very neat manner in which the plans and details are served up every month. I am taking five other publications of this class, and feel sure that I derive more practical information from your illustrations than from all the others combined. I have all the volumes bound, and regard them of great service to me in all the departments of building.

is extremely faulty. The upper roof is too flat for the durability of the shingles, and is also too flat for strength. The method shown in the first of my sketches (Fig. 2) is, I think, a better way of framing, and takes no more timber. In these days of modern hay forks and carriers, however, I should recommend the plan shown in Fig. 2.

From F. F., *East Bloomfield, N. Y.*—I notice a plan of a gambrel-roof barn in a recent number of *Carpentry and Building*, and a request from a correspondent for assistance in framing the same. As I have had considerable experience in this kind of work, I inclose a sketch (Fig. 3) which will perhaps be of some assistance. A barn framed as I have indicated not only looks well, but it has the advantage of large capacity. The rule for proportioning a gambrel roof is to draw a half circle which will touch the lower point of the rafter, the hip and the ridge. This gives a rise of 17 feet in a run of 7 feet for the lower rafters, and a rise of 7 feet in a run of 17 feet for the upper ones. Both sets of rafters are of one length. As

this is very flat for the upper pitch, it is sometimes thought better to raise it to one-fourth pitch. "H. H. B." says the cap of the purlin is the trouble. Now I set the purlin posts in one fourth of the width of the building and set the plate on top of the post. I let the upper rafters run by the plate in order to meet the lower rafters. This makes a stronger roof than when the plate comes in the hip. By putting in long braces, as shown in the diagram, the tie beams between the lower posts can be taken out for using a horse fork. There is no danger of the building spreading.

From B. L. W., *Scipioville, N.* Y.—I inclose a sketch of my way of framing purlin work for gambrel roof barns, Figs. 5 and 6. I trust it will be of benefit to "H. H. B." The sketch

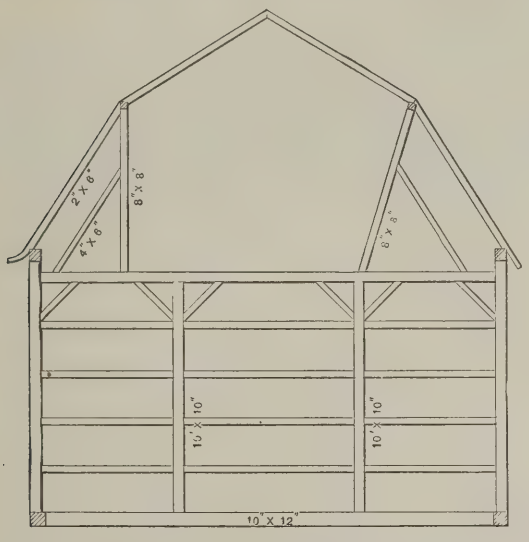


Fig. 5.—Diagram Accompanying Letter from B. L. W.

Fig. 6.—Truss Described by B. L. W.

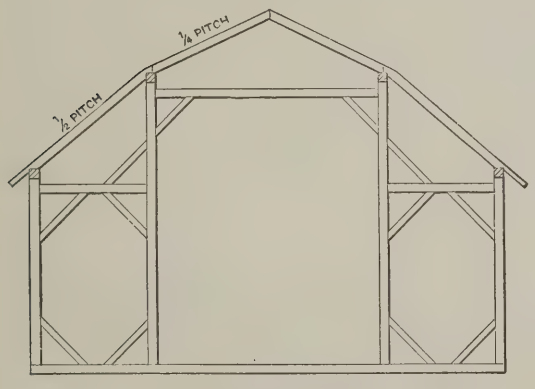


Fig. 8.—Sketch Accompanying Letter from J. B. L.

material in this vicinity is mostly hemlock. We do not use anything that is over 10 to 12 inches square.

From P. J., *Guilford, Ind.*—H. H. B. wants some assistance in barn framing. I inclose a sketch (Fig. 7) of framing as it would be done here. The scheme is one that is well adapted to the use of a horse hay fork. It will be noticed that there are no tie-beams to the purlin posts, and therefore nothing to interfere with the ropes. I have used this style of framing for some 12 years or more, and it has given good satisfaction. I have now a contract to build a barn which will be 104 feet long by 48 feet wide. I shall pursue the general plan here indicated, and if it is desired by the readers of *Carpentry and Building* I shall be glad to submit a photo-

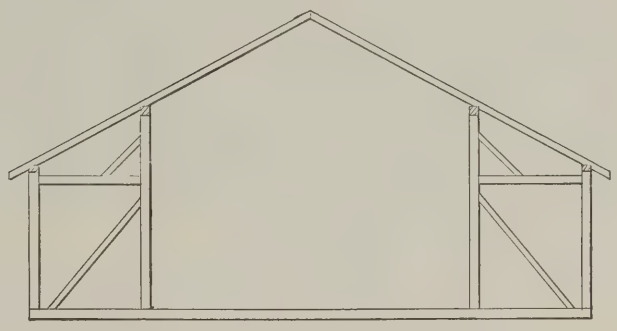


Fig. 7.—P. J.'s Idea of Framing.

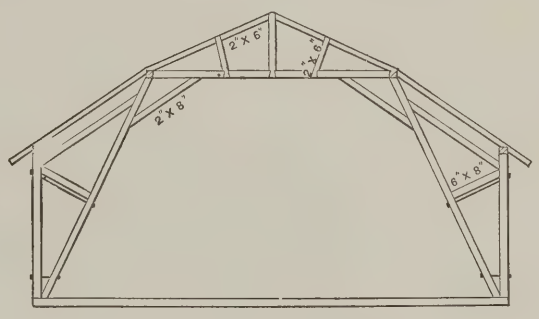


Fig. 9.—Diagram Accompanying Letter from H. G. L.

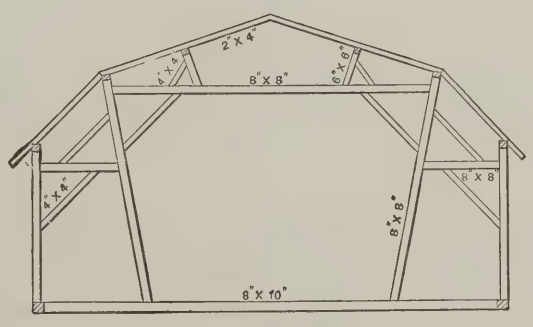


Fig. 10.—W. E. S.'s Plan of Framing.

Barn Framing.—Diagrams sent in by Various Correspondents.

his requirements. The first set of rafters should be ½-pitch and the second set ¼-pitch. Tie the bents together with cross beams or girts. I think your correspondent will readily understand by my sketch how the work is to be done.

From H. G. L., *Penn Yan, N* Y.—In the January number of *Carpentry and Building* "H. H. B." asks how he should frame his purlin plates. Referring to the sketch which was published in connection with his letter, I do not see why he wants the upper part of his roof so low. Being flat, the shingles will rot much quicker in that portion than on the other part. He evidently wishes to have the room clear below, and it has puzzled him how to accomplish this and have the posts come under the purlins. I sub-

shows two ways of framing purlin posts. Of these I give the preference to the one that is framed plumb with the outside posts. My reason for this is that when the grain or hay that is stored in the barn begins to settle, this plan does not hinder it like the one that is angular. The rafters should be placed 2 feet between centers, and directly inside each other. I also frame a truss on the inside of the end beams to keep the end bent from bulging out when filled with grain or hay. If the beams are 14 inches wide in the center, a truss would not be needed. Barns have been built in this vicinity that are from 80 to 200 feet in length, and from 30 to 46 feet in width. The main posts are from 14 to 24 feet in length. These structures have stood the severest tests of heavy winds, and have even endured what might be likened to cyclones. Our framing ma-

graph of the frame as soon as it is raised.

Note.—If our correspondent sees fit to send us a photograph of the framing referred to it will give us pleasure to engrave it for the benefit of our readers. If it is not asking too much we shall be glad to have different views of the framing, in order to be able to submit the matter to our readers with almost as much detail as though they were at the building itself for the purpose of inspecting the work.

From J. B. L., *Durand, Wis.*—In the January issue of the *Carpentry and Building* an inquiry was presented by "H. H. B." concerning the forming of a Gambrel-roof barn. I am always glad to help those who desire help when it is in my power to do so, and accordingly in this case I inclose a sketch of a roof which I think will answer

mit a sketch (Fig. 9) which I trust will be of some service as a suggestion to him. The framing shown is very strong, and any good carpenter will understand it. Instead of the bolts there might be boards spiked on each side of the posts, and these would provide ample strength. Perhaps they would answer his purpose quite as well as the rods. The struts are dovetailed into the sides of the tie beams and spiked. This method requires no more material than the plan suggested by your correspondent, but has the advantage of being much stronger.

From W. E. S., *Big Springs, Ohio.*—I inclose a rough sketch of barn framing in answer to "H. H. B." The sketch explains itself, and the roof frame as indicated will, I believe, give good satisfaction. (Fig. 10.)

Country vs. City.

From J. P., *Kenton, Ohio.*—I am a carpenter, and have always worked in the country and in the smaller towns. My partner, likewise a carpenter, having some 35 years' experience in the trade, desires me to go to some of the larger towns or cities in order to get the ideas of building fine city houses and the ways of building in different sections of the country. Where would you advise me to go? The great trouble that I fear is difficulty in getting work. I am not anxious for high wages, but I would like to make my expenses, and I can work as hard as any of the men that I am likely to meet.

Note.—It would be impossible to give our correspondent specific advice with reference to the direction in which he should search. What he wants is experience, and experience is likely to be got wherever he goes, provided he works with his eyes open. We could not tell him what city he would be most likely to find work in, or where, if he found work, he would come in contact with the kind of work he is most anxious to become familiar with. Speaking in general terms, however, the building that is conducted in cities like Cleveland, Toledo, Columbus and other places of similar importance is likely to be of more value to him than the kind of building done in cities like New York, Boston and Philadelphia. The large cities build under fixed conditions, and much that is imperative in the plans followed in them is impossible of application in other localities. If our correspondent travels about with his eyes open, as already suggested, he will pick up that which he needs, and in general it will not make much difference in what direction he goes. If he is a competent mechanic he should not fail to find work almost anywhere, unless, indeed, he be crowded out by the arbitrary rules of the trades unions.

Ice on the Eaves of Roofs.

From J. H. W., *Shelburne Falls.*—Can any one of the many readers of *Carpentry and Building* suggest means for preventing ice forming on the projecting eave cornices of roofs, thus causing the water to set back, in some cases so far as to penetrate to the interior of the building, thus causing great damage? Where roofs are covered with snow, and the warmth within the building causes the snow to melt and run down until it reaches that portion of the roof that projects within the warm interior, it freezes, often forming large bodies of ice.

Note —After the house is built and is subject to the trouble that our correspondent mentions, we do not know how it can be well prevented. If, however, at the outset it had been desired to avoid this annoyance, we think it could have been accomplished by putting under the roof a layer of building paper or other non-conductor, and thus keeping within the building the heat that melts the snow, and thus forms the initial part of the difficulty. We shall be glad to have our readers give this subject attention.

Condensation on Tin Roofs.

From T. B. D. & SON, *Lynchburgh, Va.*—Some time since we put a tin roof on a large tobacco factory. The factory is heated with steam, and we are troubled with moisture on the under side, which drops on the tobacco, causing much damage. Now we wish to know if there is any way to prevent condensation in cold weather, that is, without taking off the tin roof. Will a tarred roofing paper put under the roof on the under side prevent this dripping? If there is any suggestion that you can make in regard to this matter we shall be glad to have it.

Answer.—There is little that we can say about condensation on metal roofs that has not been repeatedly said in the past. The only remedy that is adequate in such cases is thorough ventilation, but how this can be accomplished in the various cases that arise is another matter entirely. We have advised in many instances laying the roof over roofing paper. The paper, being a non-conductor, in a great measure overcomes the tendency to condensation. When the roof is in place over a large building, as seems to be the case in this instance, it is hard to tell what can be done to remedy the difficulty. Our correspondents suggest tarred paper put by some means on the inside. The amount of water that drips from the roof cannot be a large quantity by the very nature of the case, and tarred paper is a roofing material in itself. It is possible, therefore, that they may be able to put the paper in place in a way to be equivalent to an inside roof, simply for protecting the material in the warehouse from the dripping. Possibly the tarred paper might be nailed to the rafters in a way to carry off the condensation of water. This construction might have the advantage of avoiding the dripping, from the fact that it would interpose a barrier between the moist air arising from the warehouse and the cold surface of the under side of the roof, which now has the effect of condensing the moisture. To accomplish this, it will be necessary to put the paper on very carefully, making tight joints along the rafters. This idea seems feasible, although it will be attended with some expense and trouble. If any of our readers have suggestions to offer, we shall be glad to hear from them.

Finding the Side of an Octagon.

From L. F. W , *Waco, Texas.*—Some time since I noticed an inquiry from a young mechanic concerning the rule to find the side of an octagon when the diameter is given. The question came up in one of the papers that I take, but the answer to it was not, in my estimation, satisfactory. I beg leave, therefore, to submit rules which are correct in theory as well as practice, and are easy to apply. By the diameter I mean the diameter of the inscribed circle or the perpendicular distance between opposite sides. I am prepared to demonstrate that if we represent the diameter by d and the side of the octagon by s, $s = d\sqrt{2} - d = d(\sqrt{2} - 1) = 0.414\,d$, is a true equation.

Since $\sqrt{2}$ is the diagonal of a square whose side is 1, we can find the side of an octagon on a steel square by measuring diagonally on the square from the figures denoted by the diameter. For instance, if we want to find the side of an octagon whose diameter is 12, we measure from 12-inch mark on the blade to 12-inch mark on tongue and from the result we subtract 12 inches, the remainder is the side, thus: From 12 on blade to 12 on tongue is 17 inches; from 17 take 12, leave 5, hence 5 is the side sought. It will be understood that if the diameter is in feet the side will be in the same denomination. We can, of course, as denoted by the formula, multiply the diameter by 0.414 + and get the same result, or for 12 as a diameter we get 4.968 for the side.

Filing a Cut-off Saw.

From N. M., *Belleview, Ohio.*—In answer to "R. M.," of Grand Forks, Dakota Territory, I would say that the proper way to file a cut-off saw is for the file to point toward the heel, for this reason: A hand saw should do all the cutting while it is on the down stroke. There is what is called a cutting side to each tooth, and that side of the tooth should be so shaped as to cut well. The cutting side should be square or plumb from the face of the saw blade, both for rip and cut-off saws. In filing a cut-off saw, run the file diagonally across the blade, instead of nearly square across, as in rip saws. By this means, the cutting side of the tooth will be made sharp and clean, leaving all the burr on the back edge, where there is no cutting. I have seen a great many mechanics of fair skill who were not able to file a saw satisfactorily. Their saws would

TABLE OF NUMBER OF JOISTS AND NUMBER OF FEET (IN GIVEN LENGTH AND WIDTH OF BAY) OF 2 x 8 INCH JOIST, SET 16 INCHES FROM CENTERS.

Allowance is made for 6 inches at each end to rest in or on the wall, and one joist each side of bay.

Length of joist.	L'gth of bay.	Number of joists. 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of feet in each additional joist.
		Width of bay. 4' 2"	5' 6"	6' 10"	8' 2"	9' 6"	10' 10"	12' 2"	13' 6"	14' 10"	16' 2"	17' 6"	18' 10"	20' 2"	21' 6"	22' 10"	24' 2"	25' 6"	26' 10"	28' 2"	29' 6"	30' 10"	
5	4	26⅔	33⅓	40	46⅔	53⅓	60	66⅔	73⅓	80	86⅔	93⅓	100	106⅔	113⅓	120	126⅔	133⅓	140	146⅔	153⅓	160	6⅔
6	5	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	8
7	6	37⅓	46⅔	56	65⅓	74⅔	84	93⅓	102⅔	112	121⅓	130⅔	140	149⅓	158⅔	168	177⅓	186⅔	196	205⅓	214⅔	224	9⅓
8	7	42⅔	53⅓	64	74⅔	85⅓	96	106⅔	117⅓	128	138⅔	149⅓	160	170⅔	181⅓	192	202⅔	213⅓	224	234⅔	245⅓	256	10⅔
9	8	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	12
10	9	53⅓	66⅔	80	93⅓	106⅔	120	133⅓	146⅔	160	173⅓	186⅔	200	213⅓	226⅔	240	253⅓	266⅔	280	293⅓	306⅔	320	13⅓
11	10	58⅔	73⅓	88	102⅔	117⅓	132	146⅔	161⅓	176	190⅔	205⅓	220	234⅔	249⅓	264	278⅔	293⅓	308	322⅔	337⅓	352	14⅔
12	11	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	378	384	16
13	12	69⅓	86⅔	104	121⅓	138⅔	156	173⅓	190⅔	208	225⅓	242⅔	260	277⅓	294⅔	312	329⅓	346⅔	364	381⅓	398⅔	416	17⅓
14	13	74⅔	93⅓	112	130⅔	149⅓	168	186⅔	205⅓	224	242⅔	261⅓	280	298⅔	317⅓	336	354⅔	373⅓	392	410⅔	429⅓	448	18⅔
15	14	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	20
16	15	85⅓	106⅔	128	149⅓	170⅔	192	213⅓	234⅔	256	277⅓	298⅔	320	341⅓	362⅔	384	405⅓	426⅔	448	469⅓	490⅔	512	21⅓
17	16	90⅔	113⅓	136	158⅔	181⅓	204	226⅔	249⅓	272	294⅔	317⅓	340	362⅔	385⅓	408	430⅔	453⅓	476	498⅔	521⅓	544	22⅔
18	17	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	24
19	18	101⅓	126⅔	152	177⅓	202⅔	228	253⅓	278⅔	304	329⅓	354⅔	380	405⅓	430⅔	456	481⅓	506⅔	532	551⅓	582⅔	608	25⅓
20	19	106⅔	133⅓	160	186⅔	213⅓	240	266⅔	293⅓	320	346⅔	373⅓	400	426⅔	453⅓	480	506⅔	533⅓	560	586⅔	613⅓	640	26⅔
21	20	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	588	616	644	672	28
22	21	117⅓	146⅔	176	205⅓	234⅔	264	293⅓	322⅔	352	381⅓	410⅔	440	469⅓	498⅔	528	557⅓	586⅔	616	645⅓	674⅔	704	29⅓
23	22	122⅔	153⅓	184	214⅔	245⅓	276	306⅔	337⅓	368	398⅔	429⅓	460	490⅔	521⅓	552	582⅔	613⅓	644	674⅔	705⅓	736	30⅔
24	23	128	160	192	224	256	288	320	352	384	416	448	480	512	544	576	608	640	672	704	736	768	32
25	24	133⅓	166⅔	200	233⅓	266⅔	300	333⅓	366⅔	400	433⅓	466⅔	500	533⅓	566⅔	600	633⅓	666⅔	700	733⅓	766⅔	800	33⅓
26	25	138⅔	173⅓	208	242⅔	277⅓	312	346⅔	381⅓	416	450⅔	485⅓	520	554⅔	589⅓	624	658⅔	693⅓	728	762⅔	797⅓	831	34⅔
27	26	144	180	216	252	288	324	360	396	432	468	504	540	576	612	648	684	720	756	792	828	864	36
28	27	149⅓	186⅔	224	261⅓	298⅔	336	373⅓	410⅔	448	485⅓	522⅔	560	597⅓	634⅔	672	709⅓	746⅔	784	821⅓	858⅔	896	37⅓
29	28	154⅔	193⅓	232	270⅔	309⅓	348	386⅔	425⅓	464	502⅔	541⅓	580	618⅔	657⅓	696	734⅔	773⅓	812	850⅔	889⅓	928	38⅔
30	29	160	200	240	280	320	360	400	440	480	520	560	600	640	680	720	760	800	840	880	920	960	40
31	30	165⅓	206⅔	248	289⅓	330⅔	372	413⅓	454⅔	496	537⅓	578⅔	620	661⅓	702⅔	744	785⅓	826⅔	868	909⅓	950⅔	992	41⅓

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cut nearly as well on the up stroke as on the down stroke, and this was on account of the teeth being too much like a brier tooth. A cut-off saw should be filed at a sharper angle diagonally across the blade for pine or soft wood than for hard wood.

From G. S B., *Westfield, Mass.*—I know good carpenters who file with the point of the file inclined toward the point of the saw. I also know good carpenters who file with the point of the file inclined toward the heel or handle of the saw. I know still other good carpenters who cannot file a saw properly either way or any way at all. A saw filed with the file inclined toward the point of the saw is scientifically better than one filed any other way, all of which can be practically demonstrated.

From W. D. C., *King William Court House, W. Va.*—I notice an inquiry in a recent number of *Carpentry and Building* concerning the proper method of filing saws. I have had long experience, having been a carpenter and cabinet-maker for 12 years. The point of the file ought to be toward the point of the saw. This gives a much better point to the teeth, and the point is not so likely to crumble off if the saw is a hard one.

Paneled Wainscoting.

From J. T. B., *Palmer, Mass.*—If "R. H.," of Newark, N. J., wishes his paneled wainscoting of the same width throughout, he must cut it as shown in Fig. 1, page 33, February number. If cut as in Fig. 2, the raking part must be narrower than the rest, or the corners must be clipped, which is not good practice.

REFERRED TO OUR READERS.

Dining-Room Ceilings.

From W. P., *South Boston, Mass.*—I would ask that you or some of your subscribers give, from time to time, some sketches of dining-room ceilings as they are finished in panels in many of the so-called Queen Anne houses, ranging in price from $2000 to $5000. I would also like to see the latest style of wainscoting in main entries and dining-rooms illustrated in your pages. I think that those items would be of general interest.

Block and Tackle.

From C. A. U., *Almont, Mich.*—I submit the following question to the practical readers of *Carpentry and Building* for attention: I have a barn to raise this spring, and propose raising it with block and tackle and a horse. The side posts are 8 x 8 and 18 feet long. The center posts are 8 x 10 and 23 feet in length. The collar posts are 8 x 8 and 20 feet long. The posts rest on a stone foundation. What kind of block should be used, and in what manner should the first bent be raised?

Cracking of Plastering.

From M. W. A., *Walpole, Mass*—Perhaps some practical reader of *Carpentry and Building* can tell if there is any way of framing a house so that cracks will not come in the plastering a few months after the building is completed. The cause of these cracks seems to be the shrinking and twisting of the framework as it becomes dry. If a frame is dry before the mortar is put on it absorbs the moisture from the mortar and has to shrink again. Cracks sometimes show in the very best houses as well as those which are framed according to usual methods. If there is any other cause for the cracks beside that which I have mentioned, I shall be glad to have it nominated and discussed.

The firm of Carr & Grodavent, of Leavenworth, Kan., have recently opened a branch office at Wichita, the same State, with Mr. Frank J. Grodavent in charge. Mr. Grodavent is well-known to our readers on account of his contributions to our columns.

NEW PUBLICATIONS.

PUMP CATECHISM. By Robert Grimshaw. Size 4 x 6 inches, 233 pages. Published by the Practical Publishing Company. Price, $1.

The title of Mr. Grimshaw's little book suffices to explain its general character. It is, as the author says, intended for practical pump users, and we have no doubt that these will find in it some useful information. Aside from brief descriptions of different kinds of pumps and valves and general principles of erection, connection and piping, it gives specific directions for the operation and adjustment of various special makes of pumps, as, for example, the Blake, Cameron, Dean, Knowles, Worthington, Delamater and others. A large number of engravings, representing general and sectional views and details, accompany the text, and are freely referred to. The concluding portion of the book is given up to information of a miscellaneous character, more or less intimately connected with the subject of pumps. We may note that a somewhat more comprehensive reference to the centrifugal pump would have been desirable. On this subject the book contains practically nothing, and could well bear addition.

SHOPPELL'S MODERN HOUSES.

The fifth number of the architectural quarterly entitled, "Shoppell's Modern Houses," reaches us just as we are making this number of *Carpentry and Building* ready for the press. It bears date of January, and the publication has evidently been delayed in order to put the work into the hands of those for whom it is intended more nearly the time it is wanted for use than if it had been published in the dead of winter. It contains an exterior in colors as a frontispiece. Some 50 designs of houses, costing from $1000 to $12,000, are presented. The volume also contains a design for a railroad station, and four designs for stables and carriage houses. Articles are published on the subject of color, plumbing and draining, landscape gardening and seaside cottage decoration. There is also presented the fifth chapter of the serial, entitled, "Habitations of Man in all Ages."

TRADE NOTES.

THE NATIONAL SHEET METAL ROOFING COMPANY, 520 East Twentieth street, New York, have recently issued the fifth annual edition of their illustrated circular of Walters' Patent Metallic Shingles. The first two pages are devoted to questions and answers which have been compiled from the correspondence of the company during the past five years, and which are believed to anticipate every possible question of information that might be proposed. The statement is made that four years ago there was scarcely a building north of the Ohio River that had such a thing as a tin shingle on the roof. Now there are more than 50,000 buildings covered with this article. The circular is one that contains much that is of interest to architects, builders and mechanics in general. Since the company desire to send it to every one in the trade, it will no doubt have a very large circulation. A price list of the specialties of the company's manufacture is included in the circular, and also a telegraphic cypher, thus facilitating orders by wire.

WE LEARN from E. C. Stearns & Co., of Syracuse, that over 100,000 sets of Warner's Patent Sliding Door Hangers, which have been well known to our readers for several years past, are now in use. They also inform us that 1200 leading architects accord this device a cordial approval.

A CURIOUS typographical error occurred on page xxiv in the last issue of *Carpentry and Building*. The rule separating the advertisement of Job F. Pugh's augers and bits and that of the Bridgeport Gun Implement Company was inserted at the wrong place, robbing the former of street and number, and giving the latter an address in both Philadelphia and New York. Mr. Pugh very justly complained that he did not get enough, under the circumstances, while the Bridgeport Gun Implement Company complained of having too much. Matters are properly adjusted in the present issue, as the reader will see by referring to the cards in question.

BERRY BROTHERS, with offices at No. 252 Pearl street, New York, and also in nearly all the large cities of the Union, are sending out a circular describing the wood stains which they manufacture. The circular is unusually attractive in character, and contains among other features some small bits of wood to which the stains have been applied. They illustrate three colors of mahogany, two of oak and one of cherry. The circular is one that every painter and wood-worker will enjoy examining.

WE ARE INFORMED by the Climax Rail Company, No. 134 Water street, New York, manufacturers of the "Climax" Rail for sliding doors, that in the two years that it has been upon the market it has found favorable recognition, and that it has been put in place in hundreds of houses from Maine to California, and in all cases has given general satisfaction. It is claimed to obviate the objection prevailing against the old-style rail, since it is level with the carpet, and yet provides means for keeping the door on the track. The construction is such that the door does not require to be made wider than for use with the old-style rail. It can be put in use in old houses, as well as in new, and with very little extra work.

THE DECATUR COFFIN COMPANY, Decatur, Ill., illustrate in this issue the Eureka Spiral Screw-Driver, which they manufacture. By simply pushing upon the handle of this tool the bit is revolved, thus making it possible to put a screw in place in a small fraction of the time consumed by the ordinary method.

THE HARTMAN STEEL COMPANY, Limited, of Beaver Falls, Pa., are directing attention to their steel wire, steel picket, galvanized fences. They are manufacturing a fence which they claim has various qualities to recommend it to general use. The trade will be interested in the circulars which they are sending out.

IN THE PAST we have illustrated from time to time a number of the novelties in wood-working tools brought out by the Stanley Rule and Level Company, of New Britain, Conn., and with New York office at No. 29 Chambers street. The company utilize in this issue one of our advertising pages to present a view of a number of their specialties collectively. The reader is thus afforded the opportunity of examining engravings and inspecting prices at the same time. The illustrations are appropriately headed "Improved Labor-Saving Carpenters' Tools."

THE COHOES PATENT LUMBER COMPANY, with factory at Cohoes, N. Y., and office in the Potter Building, New York City, are directing attention to the straw lumber which they have recently commenced manufacturing. They have issued a circular which describes the material and points out its general merits over natural wood, and its special advantages as a substitute for lath and plastering. A price list is included and numerous testimonials presented.

W. HASKELL KING, of Guilford, Conn., presents elsewhere in this issue illustrations of a number of specialties, manufactured under his patents by J. S. Spencer's Sons. Among the goods shown are a sash support and bolt, a burglar-proof sash-lock, and an adjustable bit gauge.

A VENTILATOR for bulk windows, adapted for use in stores, schoolrooms and other places, is manufactured by T. T. Cohen, No. 211 South Thirteenth street, Philadelphia. An illustration of this article appears in the manufacturer's card in another part of this issue.

THE H. W. JOHNS MFG. COMPANY have recently issued a very dainty pamphlet, entitled "Hints on Modern House Painting." The book contains a brief description of the use of asbestos, besides suggestions concerning the paints and colors manufactured by

this company. Several attractive illustrations appear in the pages, among which we notice the Oriental Hotel, Manhattan Beach, Coney Island; the Crossmon, Thousand Islands, Alexandria Bay, N. Y.; Fabyan House, White Mountains, N. H., and a river steamboat, all of which, it is needless to add, are structures which have been successfully and satisfactorily painted with the H. W. Johns Mfg. Co.'s line of asbestos paints. One page is devoted to a suggestion for exterior decoration and shows a combination of three colors. The pamphlet is sent free to all applicants.

J. B. SHANNON & SONS, No. 1020 Market street, Philadelphia, publish in their card in another part of this issue some prices on builders' hardware that will be found of interest to many of our readers.

CHAS. WUICHET & Co., of the National Cornice Works, Dayton, Ohio, advertise a free catalogue of galvanized-iron cornices and other sheet-metal trimmings, and a special discount to builders.

RICHARDSON BROS., manufacturers of the Richardson celebrated Saws, Newark, N. J., print a unique testimonial in their card in another part of this issue. A correspondent employs only 11 words to state that an invoice of goods had been received, that they are entirely satisfactory, and are well liked by the users, and that additional saws are wanted.

THE W. F. & JOHN BARNES COMPANY, Rockford, Ill., publish in their advertisement in another part of this issue several letters from architects and builders, commendatory of the power machinery which they are manufacturing.

THE BIRMINGHAM PLANE MFG. COMPANY, of Birmingham, Conn., invite the trade to write for a catalogue of Mosher's Iron Planes and Spoke Shaves. A price list of goods delivered to the purchaser is included in their card which appears in another column.

THE COLEMAN HARDWARE COMPANY, of Chicago, formerly the Ohio Butt Company, direct the attention of the trade to the Shumard Sash Balance and to the nickel line of barn door hangers. Their card in another part of this issue directs attention to the special advantages attending the use of these goods.

THE BOUTON FOUNDRY COMPANY, of Chicago, successors to the Union Foundry Works, direct the attention of the trade to their facilities for manufacturing general architectural iron work and such specialties as gas work apparatus, grain elevator machinery, &c. Estimates are furnished upon request. The office and works of the company are at No. 2600 Archer avenue.

THE GAGE TOOL COMPANY, Vineland, N. J., are directing attention to a woodstock plane, with improved adjustments relating to the bit, which they are manufacturing and send to all parts of the country on a guarantee. Particulars of their method of doing business will be found in their advertisement in another part of this issue.

IN ANOTHER PART of this issue Knisely & Miller, of Chicago, address the trade on the general subject of iron roofing, and present ideas concerning the action of the recent convention at Canton that will command attention. We do not understand that this firm is necessarily opposed to the opinions expressed at the meeting in question, but they do feel the necessity of some definite understanding being reached by the trade at large before radical changes are made in the methods of conducting business. Building in general will want to see just what this firm propose to do under the circumstances, all of which is suggested in their card.

WE LEARN from a Chicago correspondent that the style of houses being built there now requires so much slating that even at the present time, which is usually the dull season, there is actually a scarcity of good slaters.

THE THORN SHINGLE AND ORNAMENT COMPANY, of Philadelphia, favor us with their new circular, describing the new shingle and tile which they manufacture. A new illustration of the horse-shoe spring-lock shingle is introduced, showing how two of these shingles are put together, so far as concerns the side lap. Copious extracts from *The Metal Worker* and *Carpentry and Building* occur in the body of the circular.

IN THE CHANGE of name which has recently been announced for the well-known firm of T. C. Snyder & Co., of Canton, Ohio, there has been recognized a principle which many another firm have been compelled to take into account. Although the establishment has been thoroughly advertised for years past by the firm name, it was known to a large section of the trade simply as the Canton firm, and in some instances the Canton style of roofing was specified by architects. The business was inseparably connected with the town in which it was located in the minds of the people at large, and therefore, in assuming the name of the Canton Iron Roofing Company, a wise step was taken.

A MOVEMENT of the greatest importance to the building trades of Ptttsburgh was taken a short time since by the association of brick manufacturers. Last year the price of hard brick was $8 per 1000, and for soft brick $7.50. At a meeting held on the 10th inst., the association decided to cut the price of hard brick to $7, and of soft brick to $6.50. This is a reduction of $1 per 1000, and, it is thought, will have a great bearing in giving Pittsburgh a building boom this year.

ON THE NIGHT of February 1 fire broke out in the Egan Company's manufactory of wood-working machinery, 179 to 199 West Front street, Cincinnati, Ohio. The flames, which had orginated in some unknown manner in a three-story annex at the west end of the large four-story factory proper, had been burning for some time before detected. From its place of origin, in a machine shop on the first floor of the building in question, the fire crept upward through another machine-room on the second floor, and into the pattern shop in the upper story. From the third-story portion the flames worked their way into the large building. In the third and fourth stories of this structure considerable damage was done, but the firemen finally brought the flames under control This was only accomplished, however, after the pattern shop had been totally wrecked, the shops beneath gutted, and the west portion of the four-story structure badly damaged, entailing a loss estimated at between $30,000 and $40,000. While the fire will temporarily interfere with the work of manufacturing, the firm will suffer no serious interruption, as a quantity of stock in the east half of the building was not reached by the flames or water. On the establishment is about $100,000 insurance, placed principally in foreign companies.

THE BERLIN MACHINE WORKS have been incorporated to succeed the copartnership under the same name in the manufacture of special wood-working machinery, at Berlin, Wis. The capital of the new organization is $100,000, all paid up. This establishment is doing a large export business in sandpapering machinery, owning patents in most foreign countries

THE MANUFACTURERS of iron roofing, who held a convention recently at Canton, Ohio, have taken steps toward establishing a uniform basis of quotations for Iron roofing. As indicated in the resolutions adopted at the meeting, roofing is to be sold by the square and not by the pound. In defining a square it was stated that the sheets would be measured exclusive of side laps, but full length. This system was proposed because the side laps are a fixed quantity, while the end laps vary according to circumstances, such as pitch of roof, &c.

E. P. ALLIS & Co., of Milwaukee, Wis., favor us with a copy of their poster calendar for 1887. The poster is nearly 3 feet in length by proportionate width, and on a purple background shows two birds-eye views of the extensive works of the company. The calendar is in the shape of separate monthly sheets and is attached near the center of the poster. Radiating from it, like spokes from the hub of a wheel, are *fac similes* of the goods which the company manufacture. These include a Reynolds-Corliss Engine, a noiseless-belt roller mill, a band sawing machine and some mining machinery. Back of these, and serving as a general illuminator of the ground work are some branches of an oak tree, with the brown acorns in happy contrast with the bright green of the leaves. Altogether, the publication is very attractive, and once on the walls of an office is likely to retain its place throughout the year.

BERGER MFG. CO., Canton, Ohio, have recently added to their list of manufactured goods Corrugated Conductor-Pipe. They also offer to the trade their Eave Trough Gutters in lengths of 10 feet.

THE CORTRIGHT METAL ROOFING COMPANY, of Philadelphia, have a form of roofing in laying which they commence at the ridge instead of the eaves. It is a decided novelty in this respect, and they refer to this feature in their card which appears in another portion of this issue.

WE HAVE received from the Heap Patent Earth Closet Company, Muskegon, Mich., a price list and catalogue of the goods manufactured, bearing date 1887. There is also included a little pamphlet, written by the patentee of the goods named, entitled "Healthy Homes and How to Have Them." These publications are of interest to builders and house owners in general.

EBERTS BROS., slate roofers, 192 to 198 High street West Detroit, Mich., send us a calendar for the current year. It is a single piece of cardboard printed in colors, to the bottom of which are attached the twelve monthly calendar sheets. The days are numbered in large, clear type, and the dates of the moon's phases are indicated. Messrs. Eberts Bros., in addition to slating, do tin, iron and gravel roofing, galvanized-iron cornice work and house tinning in all its branches.

A NEW CATALOGUE of special interest to wood-workers and mechanics in general has been prepared by A. R. Thompson, dealer in builders' hardware, mechanics' tools and bronze goods, Peoria, Ill. A sample book has been sent us for examination. It contains about 100 pages, and covers a very large line of articles which builders stand in need of, including scroll saws and other foot-power machinery, hand tools and various specialties. The work has been very intelligently arranged, and it will be found useful by all who inspect it. We understand that it will be sent to any person on receipt of 10 cents in postage stamps.

WE ARE indebted to the librarian of Swarthmore College, Swarthmore, Pa., for a copy of the current catalogue of the institution, being the eighteenth annual register issued by this college. In addition to the usual particulars which such volumes contain, there is a special chapter devoted to the department of manual training, with illustrations of the buildings and arrangement of the rooms devoted to it.

THE BODINE ROOFING COMPANY, of Mansfield, Ohio, invite correspondence from the trade in general, and offer samples of their roofing free The roofing which this company manufacture is unique in its way, and has acquired an enviable reputation during the time that it has been before the public.

GOODELL & WATERS, of Philadelphia, occupy one of our pages with a display of a few of their wood-working specialties. They offer a catalogue free to all applicants. The company make a specialty of equipping planing mills, sash, door and blind factories, cabinet shops and furniture establishments.

THE SENECA FALLS MFG. COMPANY, of No. 209 Water street, Seneca Falls, N. Y., in advertising their line of foot-power machinery, offer to furnish catalogues free, and to send machines on trial. Their Empire Scroll-Saw is illustrated in their card in another column.

M. EHRET, JR. & Co., of Chicago, Philadelphia and St. Louis, in directing attention to their roofing specialties, emphasize the fact that their roofs are steam, acid and gas proof. They invite the trade to send for circulars and price list.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

A GREAT many complaints reach us from our subscribers, that their papers fail to reach them regularly. While we admit that some mistakes will occur in the best regulated establishments, and that therefore we may be responsible for a part of the miscarriages, letters relating to this subject are altogether too frequent to warrant the belief that all of the errors complained of occur at this end of the line. It would seem that papers sent through the mails are sometimes troubled with an intermittent disease, for which as yet we have found no remedy. Every complaint that reaches us is carefully investigated, and, in almost all cases, we find the subscriber's name correctly entered on our books and correctly printed in our list; and as all our wrappers are addressed by machinery, which is accurate in its work, it seems reasonable to believe that very few causes of complaint originate with us. It would seem in many instances which we have investigated that the fault lies with the local postmaster, and that the papers, on account of their shape or for some other reason, are not put in the regular delivery boxes, but are laid to one side to be specially inquired for, or, in the case of letter carriers, they are delivered in such a way as to be opened before reaching the ones to whom they are specially addressed. Newspapers, it is well known, are considered common property by many people, and in some instances the cause of complaint is the way in which papers are treated in the office or the household of the one to whom they are addressed. We lay these facts before our readers with the suggestion that where papers fail to come to hand regularly and promptly, some little investigation should be made at home and in the local post-office before a complaint is sent to us. We will undertake to correct our own mistakes, and our good nature is sufficient, in many instances, to make us do even more than this, but there is a limit to patience, and we hope therefore that our readers will help us in this matter to the extent of their ability.

ONE OF the illustrations which appeared in our columns a short time since forms the text of an article on American architecture in a recent issue of the *Bautechnische Zeitschrift*, published at Berlin, Prussia. Our German contemporary commences by saying that the conviction is becoming more and more general throughout Continental Europe that the country houses of America merit in a high degree the attentive study of European designers. It continues, that our suburban edifices, without exhibiting any effort after what is known as higher architecture, possess an air of independence and comfort, together with an evident adaptation to the varying tastes and requirements of their inhabitants. All this excites interest and pleasure particularly in persons who have become tired of the stately but often deceitful symmetry of Continental city fronts. Partly, as our contemporary thinks, there is an evident endeavor to suit the building to the habits of the owner and his family, and partly through the simplicity with which the necessity for economy has taught us to use the materials, the American country house possesses a picturesque charm which is wholly its own, and which can be traced neither to the broad, unbroken roof which economy teaches us to use, nor to the compact or varied plan or the clever devices for utilizing material and space. It is the product of all these combined. In regard to practical details of arrangement and construction, our critic finds as much praise in the works of American architects as in their composition of lines and surfaces. The planning of the rooms, the ample provision of closets, the successful avoidance of vacant and useless corners, all seem to the journal named above to show a care and skill on the part of our architects as remarkable, as the thoughtfulness which leads us to provide roof plans, a thing, apparently unknown in Europe, for the guidance of the framers and roofers. Our exchange is a little more pleased, if possible, with such matters as the double-hung windows and the sliding-door mechanism, matters that are so familiar to us that there is something surprising that any one should find in them anything new or praiseworthy.

THE LEAKAGE of gas in dwelling-houses and other buildings is a source not only of annoyance, but frequently of disaster. The experience of Pittsburgh with leaky natural-gas pipes and burners has been especially unfortunate and has led to the utmost precautions being taken to prevent the escape of gas from its proper channels. In the case of natural gas, however, the danger is very much greater than with the ordinary illuminating, or coal gas, which possesses a decided odor that permits of its presence being readily discovered. The first intimation that natural gas gives of its escape is quite likely to be an explosion. Notwithstanding the fact that coal gas has so marked a smell that the average nose will quickly detect it and if properly directed trace it to its point of escape, there appear to be many who seem to think they can see the gas more distinctly than they can smell it, and, therefore, whenever a gas leak occurs they go hunting for it with a light. It must be confessed that this method is apt to be successful so far as revealing the presence of gas is concerned, but, unfortunately for the investigator as well as the house in which the gas is escaping, an explosion, sometimes little and sometimes great, usually precedes the finding of the leak. It is so natural to pick up a light when looking for anything, never mind what it may be, that the danger of doing so in the case of escaping gas when the point of leakage is the object of search is too frequently missed sight of until the explosion calls it to mind. The first thing to do when a strong smell of gas is noticed in a house is to extinguish all the lights, and if possible intrust the search to some one who has had experience in the matter and knows what is best to be done. This advice, of course, should not be followed strictly when the gas is only smelt in one room, for then a little common sense applied to a search will often discover a gas burner turned on or something out of order that can be easily set to rights.

A WRITER in a recent issue of the Boston *Journal of Commerce* gives some valuable suggestions on gas leaks, their repair and detection, which we copy below: "A leak may be occasioned from a variety of causes, such as a fracture in the pipe from imperfect welding, from corrosion, bad fitting couplings, sprung joints in the gas meter, caused by wrenching and twisting in attaching a regulating device by an amateur "wrench fiend," a leaky dome or gas holder in a regulator attached to the meter, &c. When a leak is discovered, if in the pipe or couplings, it can be temporarily stopped until a plumber's service can be obtained by covering or filling the aperture with white or red lead, or with sealing wax or beeswax, and, as a last resort, a cloth can be saturated with molasses or any sticky substance and wound about the leak. The locality of a leak may be determined at times by taking a sponge and saturating it with a solution of strong soap-suds and applying it to pipe, couplings, &c., upon which it will form a thin film which the escaping gas will blow up into a soap-bubble. A leak may also be determined by passing the hand, if warm, over the pipe, as the gas, being of a cold nature, produces a sensation of chilliness when coming in contact with a warm hand." The writer then refers to the trouble occasioned by leaks between ceilings which are not readily located, and when found are not easily reached. The danger of investigating with a light is illustrated by a case that actually happened where a man looking for a leak mounted on a step-ladder and, against the advice of others, proceeded to light a match in the hope of setting fire to the gas where it escaped from the pipe, and thus locating the source of the trouble. The result, as expected, was an explosion, and the writer closes with the wise remark: "Like many another fool, he did not believe it was loaded until the mischief was done." Mixed within an iron cylinder and exploded with a flame, illuminating gas and air are the source of power in a gas engine, and if when used in such small quantities they have to be confined in an iron chamber to prevent damage, it is little wonder that a room full, not to say a house full, of the mixture when exploded should do considerable harm.

SOME very interesting calculations have been made on the money value of things which ordinarily go to waste. It has, for instance, been shown how millions of dollars are annually discharged from the sewers of great cities which could be saved by treating the sewage in collecting tanks

and selling the product for fertilizing purposes. Schemes are talked of for separating the refuse from stables into ammonia and other saleable products, and using the remaining straw for paper making. It is claimed for this last project that the ammonia pays all the cost of treatment, so that whatever is realized from the straw is clear profit. A more conspicuous example of utilizing wastes is the case of coke ovens. Formerly the coal was coked in an open oven, and the tar, ammonia, and other products were lost. Now, in improved ovens all this is changed, and instead of driving them off in the air, the volatile products are collected and separated, and made to yield a very important revenue to the coke manufacturers. Recently we have seen an estimate made of the value of soot. In London it is stated that 50,000 tons of soot are taken out of the chimneys each year, which, when sold for fertilizing purposes, yields the sum of $200,000.* This is an economy that might well be practiced to some extent in this country, where the soot, far from bringing any money to the pockets of the householder, too frequently is the means of taken money out, through the destruction of buildings by fire.

AN ENORMOUS table has recently been constructed in Chicago. It is enormous, not so much by reason of its general dimensions as on account of the fact that the top is made from one single piece of lumber. The table is 6 feet 3 inches wide and 8 feet long. The length, however, does not correctly represent the log from which the timber was cut. The plank from which the top was made was 76 inches wide, 15½ feet long, and 3 inches thick. It is said to be the largest plank that ever arrived in Chicago. It came from the logging woods of John Vance, Mad River, Humboldt County, Cal. The wood is of the celebrated red wood variety, and this plank is said to be without a blemish throughout.

AT DIFFERENT times during the past 10 years there have been various schemes proposed for erecting upon the site of the Madison Square Garden, New York, a large building, to serve the purpose of a theater and concert hall, and to afford accommodations for the largest possible assemblies of the people of the metropolis. Quite recently a company have been incorporated, with a capital stock of $5,000,000, for the purpose of carrying out one of these schemes. The leading spirit in the present undertaking is Mr. James T. Woodward. There are associated with him a number of names prominent in the city. Mr. Woodward's company propose to tear down the present Madison Square Garden building and to erect on its site a new, large and substantial structure, which, it is hoped, will remain a permanent exposition building for the use of the city. While the plans of the new building have not been perfected, there will be upon its ground floor, as in the present building, a great amphitheater, which may be used for exhibitions and monster meetings. Raised seats will surround the amphitheater, and under these, opening upon the streets, there will be a number of small stores. The basement will be excavated so as to be used for horse stalls, and perhaps for a large aquarium. There will be a large theater on the second floor, and smaller theaters around it for amateur performances. On the second floor will also be ball rooms, with dressing and supper rooms attached. The company are as yet undecided whether to add a third story to the building or not. All the space possible in the building will be utilized. The members of the company say that their idea is not to make money, but to raise and control disinterestedly, and for the public alone, a building which shall meet the needs of the better class of large entertainments.

THE Chicago Forge and Bolt Company, whose works were situated at Forty-first street and Stewart avenue, Chicago, are experiencing one of the disadvantages of a city location which has been felt by numerous manufacturers in Eastern towns. The people who reside in the vicinity of the works complain that they cannot sleep at night on account of the noise made by the machinery. Quite a number of property owners have therefore brought suit against the company for damages, the amounts claimed ranging from $1000 to $3500. This is one of those peculiar cases which are not governed by statute and which are therefore decided upon the merits of each particular controversy. It is impossible to determine without full inquiry what the facts are in this case, but it is very probable that these works, by employing a considerable number of men and converting a large quantity of crude material into highly necessary merchantable forms, confer a much greater benefit upon the various interests of their immediate vicinity than can be offset by the annoyance caused to a few individuals by the noise of the machinery. The specific charge against the company is the maintenance of night work, which prevents the complainants from sleeping. If such an establishment as this were not permitted to be run at night, the efficiency of the plant would be seriously curtailed, and the number of men employed would be reduced. By working night and day, the capacity of an establishment is about doubled, and at such a time as the present, when the demand for iron and steel products of all kinds is unusually heavy, it is of the highest importance that every facility should be accorded to manufacturers for the rapid completion of the orders intrusted to them. Under such circumstances it may be necessary to run at night, and it would be a cause of gratification to most communities that so many more persons are thus provided with employment.

THERE are, of course, circumstances which would remove a manufacturer beyond the pale of sympathy and subject him to the certain expectation of prosecution for maintaining a nuisance. One of these is the erection of works in a neighborhood which has long been given up to residences. The noise of machinery, the smoke of furnaces, the passage of heavily-loaded wagons and the tramping of crowds of workingmen might be just what the residents of that locality had sought to avoid when they pitched upon it as a place of abode, and the location of a factory, shop or mill there would naturally be looked upon as an invasion to be repelled if possible. But this was not the case with the Chicago Forge and Bolt Company. In fact, they had but recently removed their works from the heart of the city to a sparsely-settled district. If it is found that they are not secure from prosecution of this sort, but that damages can readily be collected by persons who fancy themselves aggrieved, there are numerous other manufacturers similarly situated. This is therefore a case of greater importance than a mere suit between individuals. If, however, the company maintain themselves against the suits which have been brought, the unfortunate losers will have to wait but a brief time, hardly more than a year or two, when they will cease to be troubled by these unmusical night noises. If in this time they do not become accustomed to the thuds of the hammers and the clatter of the machines, they may be sure that business will not always be as brisk as it now is, and that unless this company are exceptionally fortunate in securing orders there will be long stretches of months or weeks when the slumberer will be undisturbed by nightly noises from this source.

IN RECENT issues of *English Mechanic* the subject of "Burnt Air," has received considerable attention from correspondents of that journal. One writer expresses the opinion that when air is brought in contact with highly-heated metal surfaces the dust is burnt and the moisture is decomposed, the oxygen combining with the metal and the hydrogen remaining free. It is the presence of this free hydrogen that is referred to as one of the worst features of burnt air, for it produces difficulty in breathing, and gives rise to other distressing symptoms. Another effect of heating air is, that its capacity for moisture is largely increased, which makes it seem dry and harsh. It is a well recognized fact that air coming directly from contact with highly-heated metallic surfaces is very unpleasant to breathe, and, presumably, is injurious to health if constantly indulged in. The cause of this, however, is not to be sought in the decomposition of the moisture or suspended water. If steam be passed through a red-hot tube filled with iron turnings, dissociation will occur to some extent, but even when the heating surface of a stove or furnace is at a cherry-red we do not think any appreciable amount of hydrogen will be liberated from the moisture in the air, while below a red heat dissociation is impossible. The unpleasant, not to say injurious, effect of breathing what is known as burnt air is due to two causes. One cause is the burnt dust particles which produce a disagreeable odor, and the other is that the capacity of the air for moisture is thereby increased, so that, when breathed, the moisture rapidly evaporates from the throat and lungs, and produces in consequence a dry, parched feeling.

THE PLATES.

In plate XIII we present a perspective view of a house in brick, with galvanized-iron trimmings, recently erected in Dayton, Ohio, for Mr. I. L. Baker. The architect is Mr. Charles I. Williams. Details of the sheet-metal work, which was done by Charles Wuichet & Co., of Dayton, Ohio, will be found in the printed pages preceding the plate. A more extended description of this work is presented elsewhere.

In plate XIV we present the front and side elevations and floor plans of a study in house designing by Charles F. Chase, No. 65 Westminster street, Providence, R. I. The house represented is one that was built some time since, although a slight change in the arrangement of the bathroom and water-closet was made in the execution of the plan. It will be noticed that the house is heated by a furnace so located as to be conveniently accessible for attention, and also for receiving a supply of fresh air and discharging the warm air into the several rooms. According to the architect's memorandum, the interior finish is to be of soft wood, with the exception of the bathroom, which is specified to be finished in cherry. The estimated cost of the design, based upon actual construction, above referred to, is in the neighborhood of $3500, including gas fixtures and plumbing.

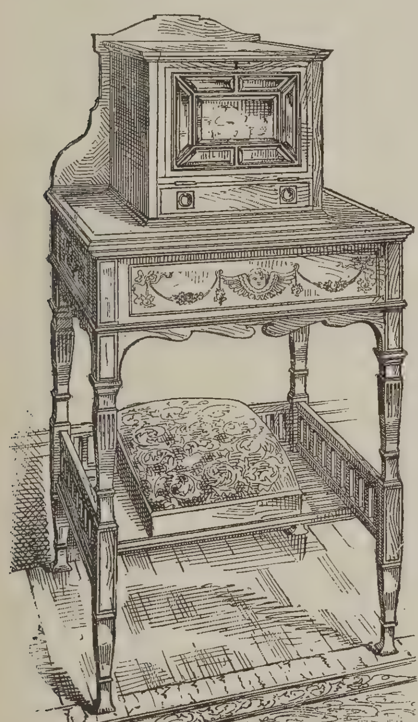
Plate XV is devoted to specimens of recent French architectural details. One of the views represents a paneled ceiling designed by M. Reynold, and the other a gateway designed by M. Geisse, both being architects residing in Paris.

Plate XVI contains designs and details of overmantels elsewhere described.

Surprise Boudoir Cabinet.

The term "boudoir," which is gradually coming into use, has a much wider meaning than bedroom. Boudoir signifies an apartment, which, while serving the purpose of a bedroom, is, at the same time, intended to serve as a sitting-room. The boudoir has of late been much discussed among those who study the all-important question of household furnishing, and such people will undoubtedly be interested in the design of a boudoir cabinet, which we present by means of the accompanying cuts. This cabinet has been called the "Surprise," and, as will be gained from an inspection of the engravings, embodies several different articles in one, while the arrangement is such as to be a surprise to many who examine it for the first time.

In our first illustration it takes the form of a table, china cabinet, and to all appearance has no other object in view. By means of the flush brass handles, just below the transparent glass flap, the whole of the front of the cabinet pulls forward in the character of a deep drawer. The lid being hinged to the back of the drawer by a double brass hinge, and pivoted to the sides of the box at a convenient angle, rises at one and at the same time in the form of a toilet glass. The toilet glass is independent of any complicated glass movement, and by means of the drawer can be easily and firmly adjusted to any reasonable angle.



The Surprise Cabinet.—Fig. 1.—General View.—Closed.

The drawer is intended for the reception of a carefully selected set of art toilet pottery, which answers the purpose of show china when closed, thus possessing the additional qualification of being useful as well as ornamental. The back of the drawer is upholstered, to answer as a convenient cushion for brooches and pins. Being so placed, it is out of the way, and at the same time always accessible. The fixture of the pincushion is a desirable feature, as, ordinarily, this particular article is the nuisance of the toilet. It is generally to be found either down behind the table or under one's feet—in every place but the right one. The table part is fitted with drawers upon either side for hosiery, jewelry, &c. The underframing is arranged as a slipper-box, with an upholstered lid, which does duty as a footstool. When the toilet is complete the whole thing can at a moment's notice be converted into an elegant little china cabinet by simply putting up the flap and shutting the drawer. The introduction of such a piece of furniture into the boudoir for dressing purposes would, we think, considerably enhance the character and value of the apartment. We will now proceed to describe how to make this, so that our design

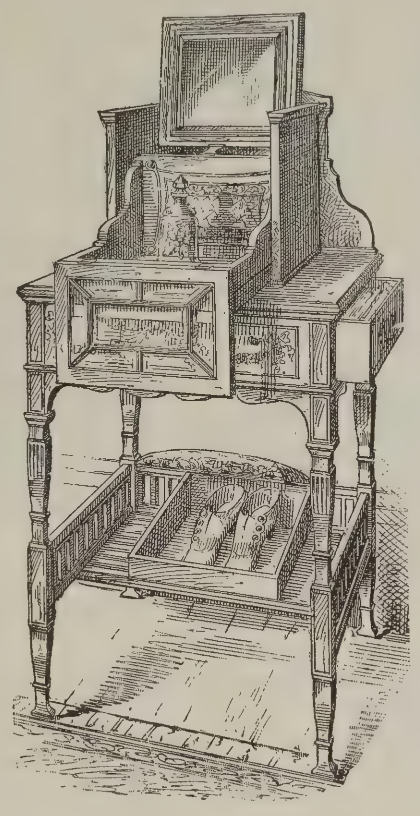


Fig. 2.—General View.—Open.

may not come under the oft-heard criticism: "Very pretty, but not practicable."

The most suitable woods for the purpose required would be dark mahogany or Italian walnut, inlaid or otherwise, or satinwood might be used with success. The size of the cabinet should be about 2 feet 6 inches high to the top of the table part, the table

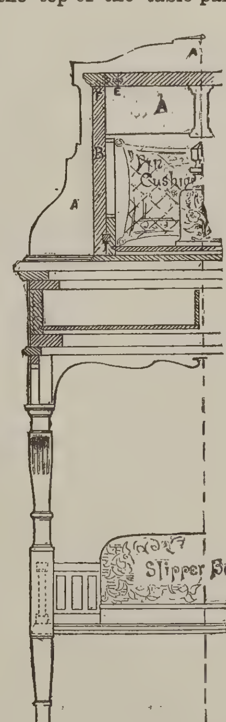


Fig. 3.—Half Longitudinal Section.

top to be 2 feet wide by 16 inches deep, and the box on the top of the table about 15 inches wide by 12 inches high. It will be best to make the combined toilet arrangement quite separate, and then screw it on to the top of the table from underneath the same. The backboard *a* of the toilet arrangement, including the pediment and wing brackets, should be made entirely out of one piece of ¾-inch stuff; the ends *b* to be ¾-inch finished thickness, and to be screwed to the back; the bottom board *c* to be ⅜-inch, finished, and also screwed to the back and ends; the top lid *d* to be ¾-inch, finished, and clamped at the ends, as shown at *e* upon the working drawing. In fixing the ends of the box, the clamps should be cut through and dowelled to the ends of the box, as shown at *f*. The mirror on the inside of the lid should be laid on and fixed by rebated molding, firmly glued. It will be seen that the specially designed hinge *h*, being screwed to the back of the lid and the top of the back of the drawer, upon the drawer being opened, causes the lid to revolve upon brass pivots, *g*, and open as shown by the dotted lines on the working drawing. The ends of the drawer should be dovetailed to back

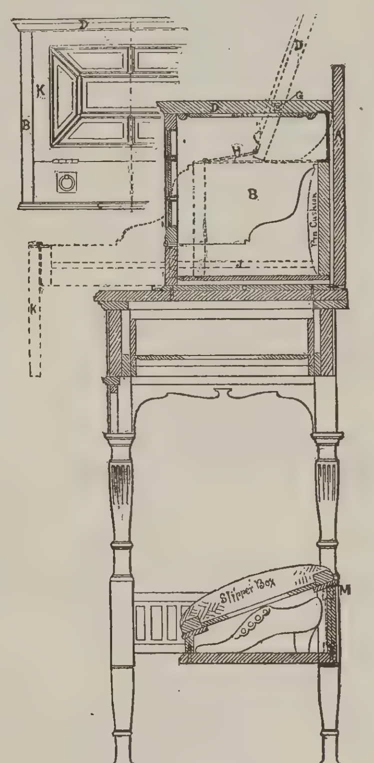


Fig. 4.—Cross Section and Elevation of Upper Front.

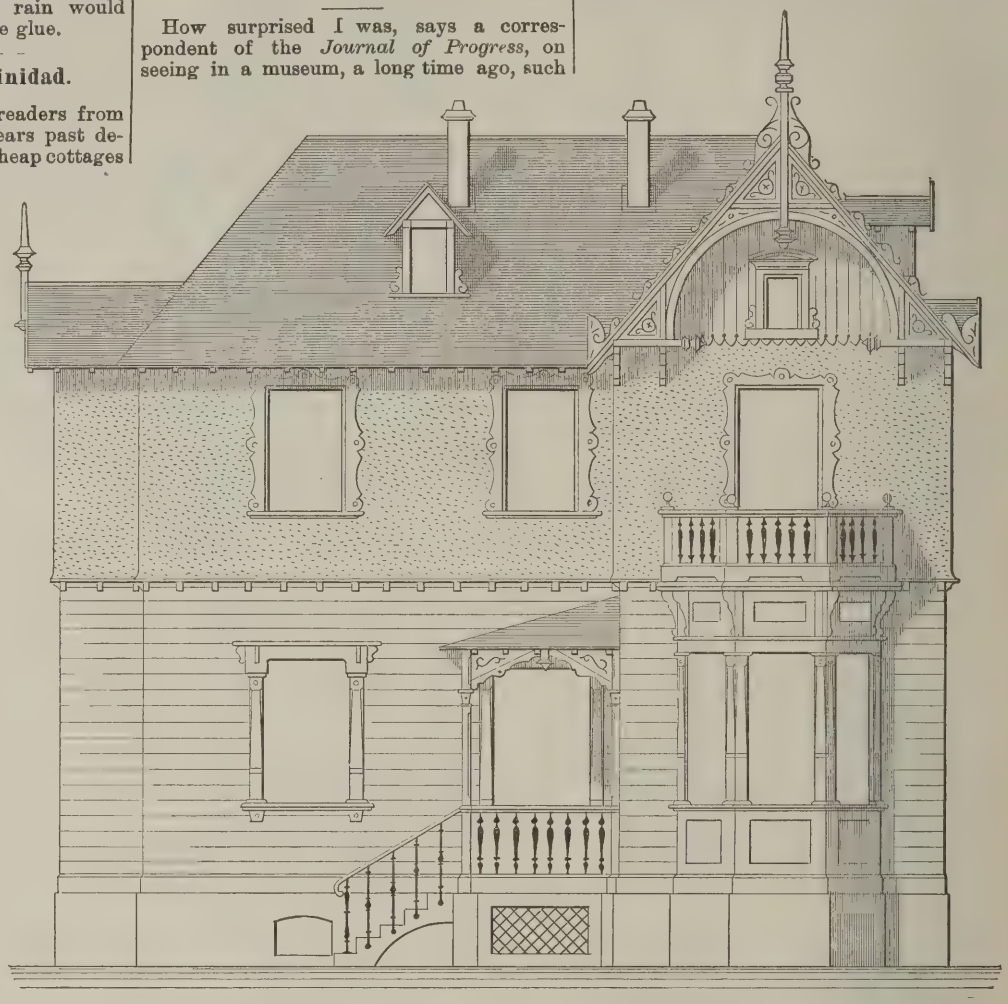
and front, and slide on a tongue and groove, as shown at *j*. The flap door at *k* should be glazed and framed up, and hinged to the front of the drawer, which opens with the same as shown by the dotted line. The front of the drawer should be fitted with two flush brass handles, in order to allow the flap to lie flat with the front of the drawer when it is let down. It is necessary to have the jewel drawers at each end of the table framing, these being more accessible there when the cabinet is in use as a toilet table. It will be seen by reference to the drawing that if the drawers were placed in front of the table they would be inconvenient to get at on account of the flap. These are constructed in the usual way, as shown. The back, front and ends of the combined foot-rest and slipper box should consist of ¾-inch stuff, which should be screwed to a bottom board of ½-inch material, the stuffed lid to be hinged to the back of the box, as shown at *m*. The top and bottom rails of the fretwork gallery should be dowelled into the legs, and the bottom of the slipper-box screwed into the lower rails and back legs of the table. The fretwork should be cut out of ½ inch wood, and grooved into top and bottom rails of ¾ inch wood. The legs of the table should be cut out of 1½-inch stuff.

The question of how to prevent checking in the ends of timber when it is being seasoned is engaging the attention of En-

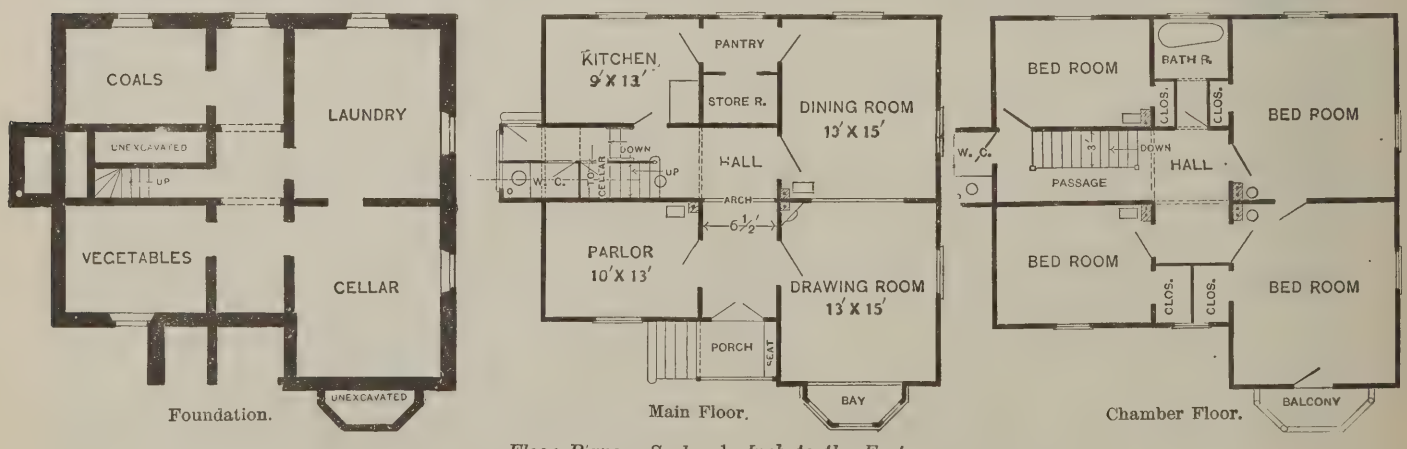
glish engineers. According to a recent report it has been ascertained after trying a number of expedients, that by painting the ends of the timber with thick glue several kinds of lumber can be dried without checks. It is supposed that the glue penetrates far enough to cement the layers of the wood together near the ends, and thus keeps the ends from drying faster than the rest of the wood. Of course this method requires seasoning under cover, since rain would have the effect of dissolving the glue.

House Building in Trinidad.

We have laid before our readers from month to month for several years past designs of houses varying from cheap cottages to elaborate mansions, and in design ranging from the simplest to the most ornate as built in different parts of our own country. In one or two instances we have overstepped the lines, and have given examples of Canadian construction, and we have referred incidentally to what is being done in Great Britain. Isolated features of construction from different parts of the world have also been laid before our readers occasionally. As a variation from the general monotony of our work, and as something likely to interest those who follow our pages most carefully, we present at this time the design of a house erected in the Island of Trinidad, West Indies. The design is furnished by Mr. G. Gerold, of Trinidad, and represents in many of its features the current architecture of that portion of the world. The design varies in many features from what is in use in this country, and the character of the drawings, which we have been careful to reproduce in our engravings, are also different from that which is usual with us. We present the elevations, floor plans, and a portion of the details in this number, and shall follow with the remainder of the details in another issue. The cost of the building, as estimated by the designer, without profit to the builder when erected in Trinidad, is some $4000. In describing this piece of work, the architect refers to the style as being German Renaissance. Concrete steps are used to the porch, and a seat is provided which, he says, will serve as a pleasant place for a siesta. The house, and is so arranged as to be readily ventilated. Referring to the exterior of the house, it will be noticed that the upper story is finished by plastering, and that the cornice or eave trough is of the simplest possible description. The work throughout will no doubt form an interesting study for many of our readers.



House Building in Trinidad.—Design by G. Gerold.—Front Elevation.—Scale, ⅛ Inch to the Foot.



Foundation. Main Floor. Chamber Floor.

Floor Plans.—Scale, 1/16 Inch to the Foot.

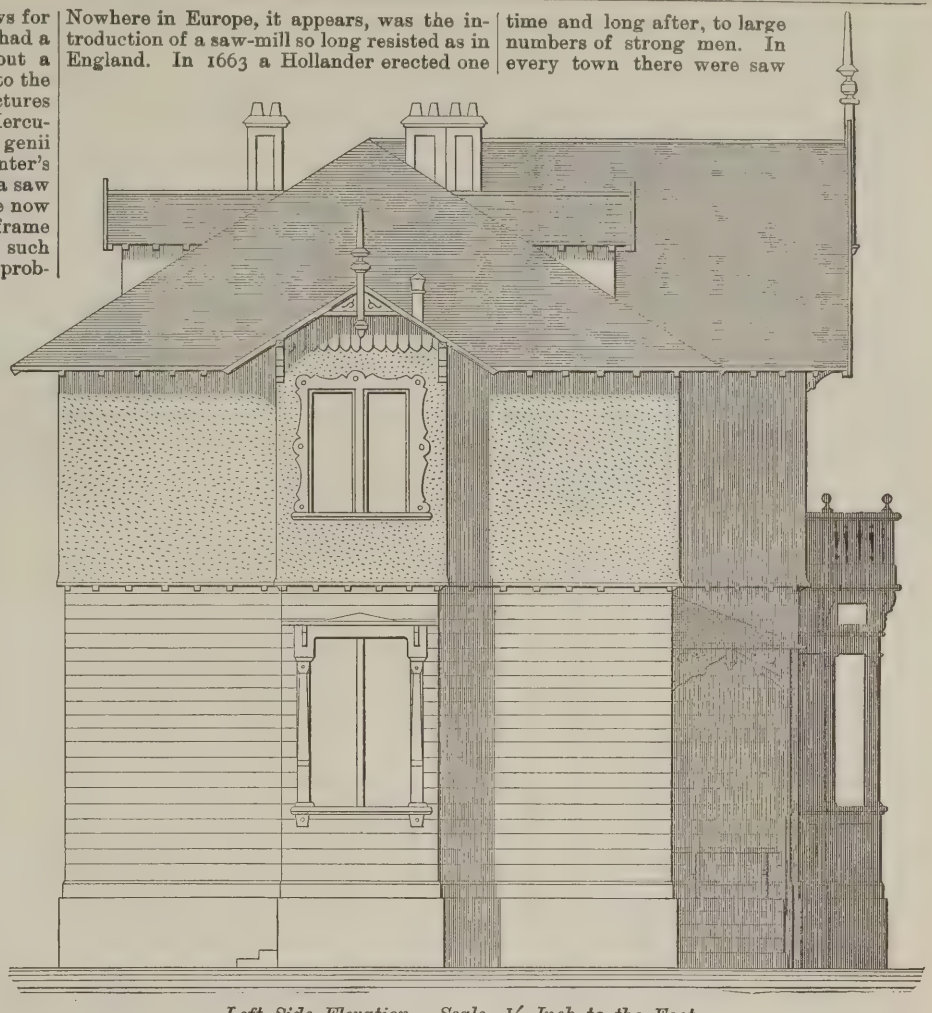
History of the Saw-Mill.

How surprised I was, says a correspondent of the *Journal of Progress*, on seeing in a museum, a long time ago, such things as scissors, seal rings, necklaces and pairs compasses, that were taken from Egyptian tombs 3000 years old? But, after all, men were men 3000 years ago, and women were women. They had the wants, the needs, the vanities of men and women, and they had brains not unlike our own to supply them. The most boastful Yankee (not that Yankees are more boastful than other people) in some of the rooms of the British Museum is obliged to confess that the ancients originated a great many good notions which we moderns have only improved upon. For instance, there are few tools more ancient than the saw. All the ancient nations appear to have had it—certainly, the Hindoos, the Egyptians, the Greeks and the Romans. The saw may have existed even before there were any men on earth. There is a creature called the saw-fly, with the saws in its tail, which is actually used for sawing the stems, leaves and fruits, wherein its eggs are to be deposited. There is also a sawfish, the long snout of which is a saw. It is said also that the original inhabitants of the Island of Madeira found a ready-made saw in the backbone of a fish. The Greeks had a pretty story attributing the invention of the saw to the accidental finding of the jaw-bone of a snake by one Talus, who used it to cut through a small piece of wood. Being a slave, and finding that this jaw-bone eased his labor, he made a saw of iron, and thus gave mankind a new and most valuable tool. The ancient saws differed from ours in two ways. The teeth were so arranged that the cut was made by pulling instead of pushing, and the teeth, instead of being set one to the right and one to the left alternately, were set so that ten or a dozen in succession were slanted one way and the same number the other way.

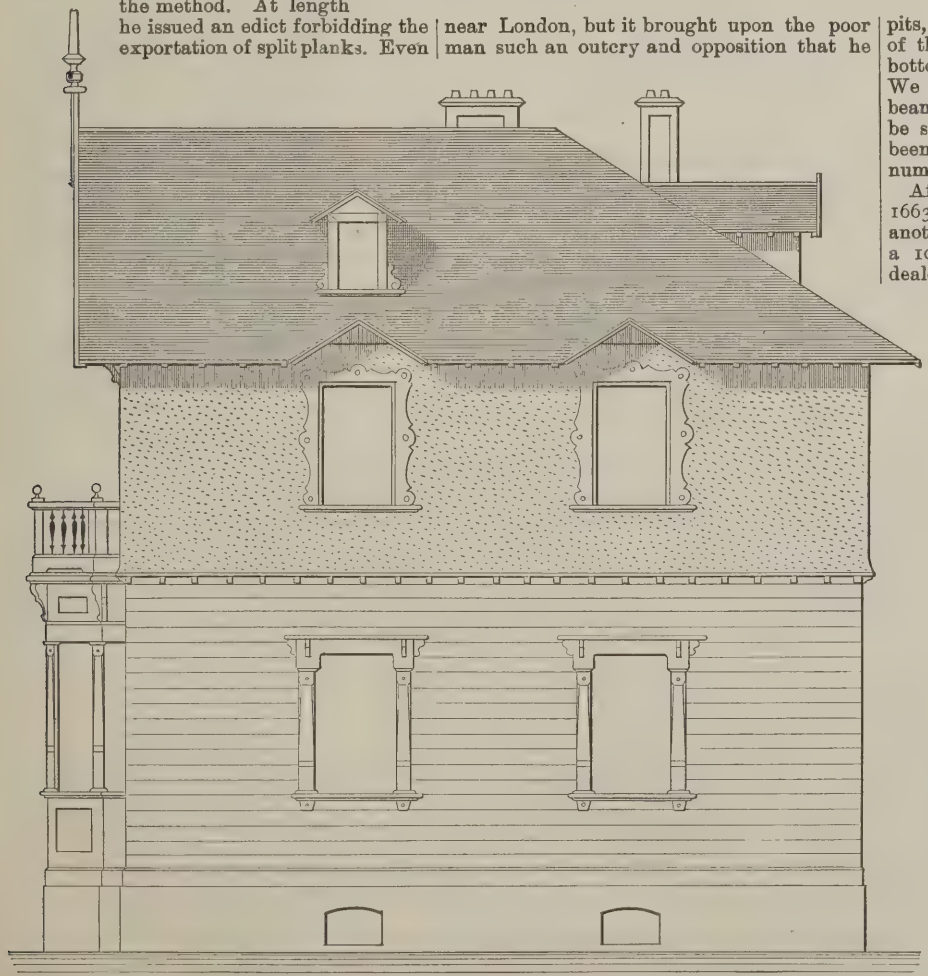
The ancients have several varieties of the implement. The Greeks, for example, had

cross-cut saws for two men, also saws for cutting marble into slabs. And they had a kind of tubular saw for hollowing out a marble bathtub, similar in principle to the method now employed. Among the pictures uncovered in the buried city of Herculaneum there is a representation of two genii sawing a piece of wood on a carpenter's bench very much like ours and using a saw with a wooden frame similar to those now employed. Still more strange, the frame saw tightened with a rope and stick, such as our street wood-sawyers use, was probably as familiar to the Romans as it is to us. A saw-mill, however, by which wind, water or steam is made to do the hardest part of the work, was not known to any ancient nation. Sawing by hand, next to digging a stiff clay soil, is about the hardest work that men ordinarily have to do. It is therefore not surprising that our ease-loving race began to experiment a good while ago with a view to applying the forces of nature to the performance of this toil.

A learned German investigator who has investigated the subject very thoroughly states that the first trace of saw-mill yet discovered is in the records of the German city of Augsburg, for the year 1337. The reference is slight, and does not fix the fact with certainty. But there are two saw-mills near that city, which are known to have existed as far back as 1417, and they are still used. Before that valuable invention all boards and planks were split with wedges, and then hewn to the requisite smoothness with the axe. The splitting of boards is still practiced in remote settlements, as I myself have seen, and it is recorded of Peter the Great, of Russia, that he had much difficulty in inducing the timber cutters of his empire to discontinue the method. At length he issued an edict forbidding the exportation of split planks. Even in Norway, covered with forests as it was, there was not one saw-mill before 1530. Nowhere in Europe, it appears, was the introduction of a saw-mill so long resisted as in England. In 1663 a Hollander erected one near London, but it brought upon the poor man such an outcry and opposition that he was obliged to abandon it. The sawing of timber by hand furnished occupation, at that time and long after, to large numbers of strong men. In every town there were saw pits, as they were called, for the convenience of the sawyers, one of whom stood at the bottom of the pit and the other on the log. We can easily imagine that when every beam, plank and board, thick or thin, had to be sawed by hand, the sawyers must have been a formidable body, both from their numbers and their strength.



Left Side Elevation.—Scale, ⅛ Inch to the Foot.



House Building in Trinidad.—Right Side Elevation.—Scale, ⅛ Inch to the Foot.

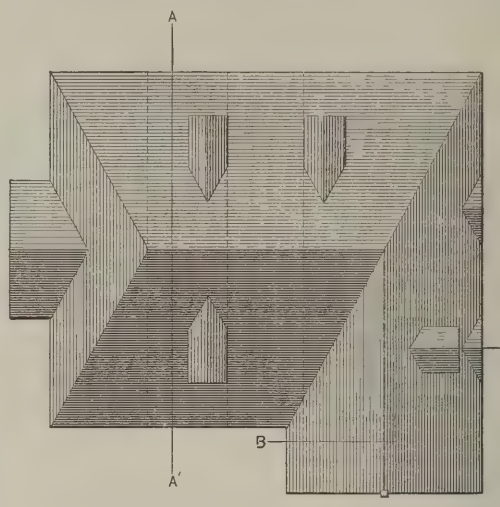
After the failure of the Dutchman in 1663, there was no serious attempt to start another saw-mill in England for more than a 100 years. In 1767 an English timber dealer of large capital built a saw-mill to be moved by the wind. It was thought to be a great and difficult enterprise, and it attracted much public attention. Some years before an author had explained the advantages and economy of saw-mills; then the society of arts gave the scheme of building one their approval, and, finally, the mill was actually built by an engineer who had studied the saw-mills of Holland and Norway. No sooner was the mill complete than the sawyers assembled in great force and tore it to pieces. The Government compensated the owner for his loss, as was just. Some of the rioters also were convicted and imprisoned. A new mill was then built, which was allowed to work without molestation, and proved so profitable that others were soon introduced. In no part of the world, probably, has the saw been more minutely and curiously developed than in Great Britain, where they have saws so fine as to cut diamonds, and circular saws nine feet in diameter and a quarter of an inch thick. They have also veneer saws so accurately adjusted as to cut 18 slices of veneer from a rosewood plank an inch thick. In London they will put a log of mahogany upon the mill and cut it into slices so thin that the sawdust weighs more than the veneer. Yankees have beaten this performance. They take a piece of mahogany or rosewood, soften it by steam, and

cut it into veneers with a knife, without making a grain of sawdust. Daniel Webster tells us that his father had a saw-mill after his removal to New Hampshire, at the source of the Merrimac River. Daniel, who was by no means fond of labor at any part of his life, liked nothing better in his boyhood than to attend this saw-mill, because when he had put his log in position and started the saw, he had 16 good minutes for rest or reading before the business required further attention.

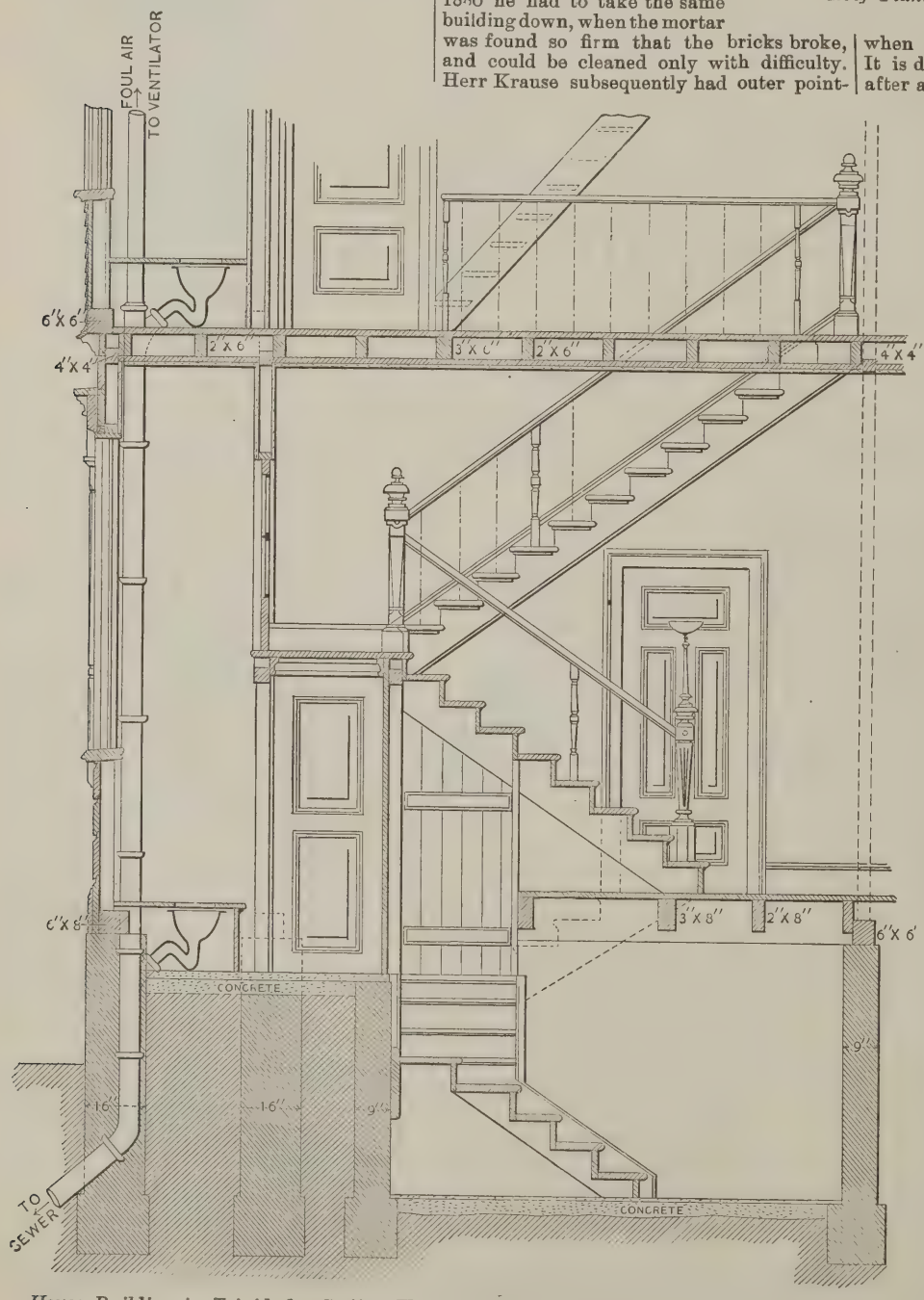
Frozen Mortar.

The use of mortar during frost, whether in plastering or for laying brickwork, is of great interest to our readers, and the subject has frequently come up for consideration. In a recent issue of the *London Builder*, a *résumé* of this question is presented, giving the results of investigations by German and other engineers. What is printed is of interest to our readers, and accordingly we append the article in full:

Some time ago the police authorities of Berlin issued an order forbidding the construction of brickwork, should the temperature fall to or below 2° R. (26° F.) This order being based on the supposition that mortar freezes at that temperature, and does not set, Herr Krause, architect, of Stropp, sent a communication to the *Baugewerke-Zeitung*, in which he publishes his experiences, which by no means seem to bear out the necessity for issuing the order. We give a *résumé* of Herr Krause's remarks, as well as of the opinions of some other German architects upon the matter. Herr Krause states that in the winter of 1856 he was compelled to erect a small building during a very sharp frost, the temperature being down to from 4° to 8° R. (23° to 14° F.) As bricks and sand were frozen, his workmen had great trouble in properly setting the bricks, the mortar freezing under their hands. It would have been too expensive to warm all the materials previously. He therefore had the lime slaked in small quantities, mixed the mortar hot, and had the brickwork liberally pointed. He fully expected to find the mortar perished in the spring, but he was greatly mistaken, for the work was as firm as if it had stood for several years. In 1880 he had to take the same building down, when the mortar was found so firm that the bricks broke, and could be cleaned only with difficulty. Herr Krause subsequently had outer pointing done at several degrees of frost, and always found that if lime mortar had been subjected to frost for about 10 days it had set as firmly as mortar made in the summer in as many months. The architect in question says that if it freezes and the frost continues for some time it is much firmer than when applied in the hight of the summer. It is different when a sudden thaw sets in after a sharp frost. Herr Krause had executed, during an alteration, a wall 10 m. high and 3 m. wide, with three windows placed over each other, and joined to an old brick wall, when suddenly a thaw set in. The wall settled about 6 cm., and bulged out, so that he had great trouble in preventing it from collapsing. A sudden frost, however, made it firm again. After 20 years the wall is as good as ever, and there are no cracks. In that case, however, he had omitted to use unslaked lime, employing only hot water. The bricks had been stored in a heated room.



Roof Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.



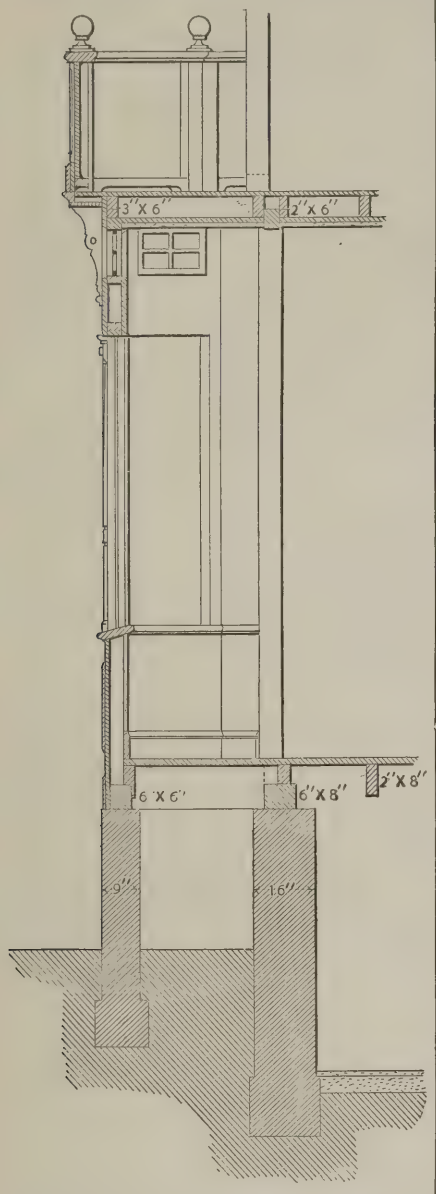
House Building in Trinidad.—Section Through Staircase, Indicated by X on plan of Main Floor.—Scale, ¼ Inch to the Foot.

Herr Krause has come to the conclusion that continued frost has the contrary effect upon mortar to what is generally supposed. Herr A. Klemm, architect, of Stuttgart, expresses the same opinion in a communication which he sends to the *Deutsche Bauzeitung*, in which he says that in the winter of 1848–1849 the works required for altering and fitting up the Prussian House of Deputies had to be carried out during a most severe frost. Notwithstanding this fact the brickwork, executed with freshly slaked hydraulic lime, was found to be so firm in 1867, when alterations had to be made, that in some portions wedges had to be used in breaking it up. Herr Klemm adds that in his country (Würtemberg) it is the general opinion that frost not only does not injure the brickwork nor the plastering, but it improves its quality. The frost, however, should continue for some time. Herr Klemm expresses surprise that doubts could be entertained on the subject. A Berlin firm of builders, Herren Ende & Böckmann, writing on the same subject to the *Deutsche Bauzeitung*, state that in the autumn of 1864 they had orders to erect a warehouse near Unter den Linden during the winter. They were at first indisposed to undertake such work in that season; but circumstances demanded speed, and building operations were continued during the frost. They fully expected to find the brickwork faulty in places when the spring came, and had made up their minds that they would have to replace some of it. They were agreeably surprised to find the brickwork perfectly sound—in fact, it seemed to have set exceptionally well. Since that time the above Berlin firm of builders have not hesitated to continue bricklayers' work as long as they could—that is to say, as long as the

water did not freeze on the bricks or the mortar in the pans. It should be added that the lime mortar used at Berlin is said to be of exceptionally good quality.

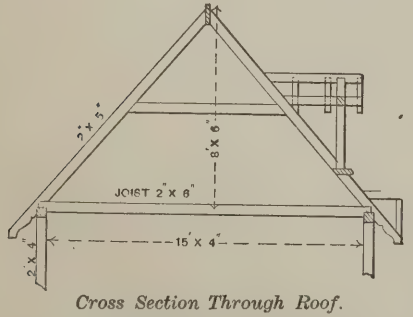
Over-Mantels.

We add to the series of designs of over-mantels commenced in the March issue three studies contained in one of the plates



House Building in Trinidad.—Vertical Section Through Bay Window.—Scale, ¼ Inch to the Foot.

of the present number. Details for one of these are given, which will be of material assistance to the mechanic in preparing the working drawings that will be necessary in constructing this work. The over-mantel shown in Fig. 8 is intended to be made up

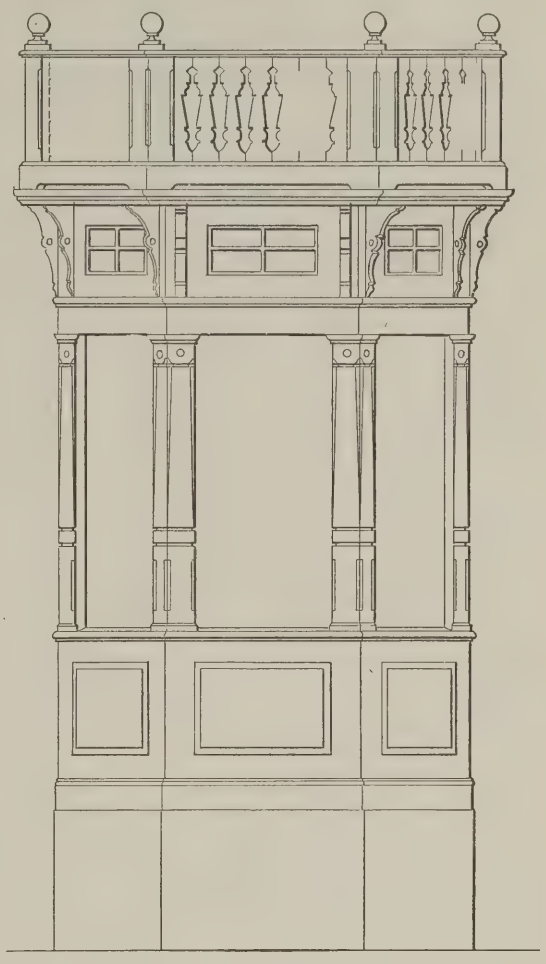


Cross Section Through Roof.

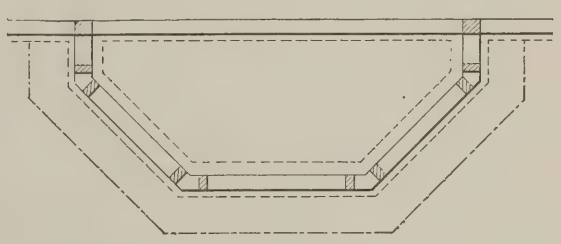
4 feet high by 4 feet wide, these being the extreme measurements. As the dimensions are but 6 inches higher and 4 inches wider than those of Fig. 1, it will not be necessary to make the backings heavier than those required for our previous sketch. They must therefore be cut out to the same sizes as stated in the preceding article, faced up, and the sides veneered. Next prepare shelves, brackets, pediments, &c., after which proceed with the pillars, which should be worked out of stuff 1½ inches square, and cut off to the required length—in this instance, say, about 1 foot 6 inches long—then plane up quite square, ready for the turner to turn to the pattern given. The panel above the center plate, which should be a loose one, might now be proceeded with. First make an oblong frame, half lapped at each corner in precisely the same way that the "backings" are made, then cut out "facings" to the curved shape shown in sketch, and fix them on loose frame. In the top corners glue on a curved block of the same shape as "facing," which will form a rabbet for the mirror. The fluted panels at top of middle and side divisions should next be cut out. Sometimes the flutings are done by the carver, but as a rule the cabinet-maker prefers to work them himself with a small round plane. When manipulated in this manner the flutes are generally truer and better finished than when done by a carver. It is necessary that the grain of the wood be vertical, for if horizontal it would not work at all clean and smooth, but, on the other hand, would appear rough and unsightly. It is advisable to allow sufficient stuff both for the middle and side divisions, so as to be able to cut off to proper length and width. If each panel were fluted separately time would be lost. In order to strike the flutes evenly a straight-edge should be fixed on panel, so as to guide the plane. The job should now be ready for polishing. When quite hard commence to fit up.

As will be observed, our sketch shows the blocks of pillars let into the shelves; each shelf must have a square piece cut out of front corners ⅛ inch less than the thickness of block of pillars. Next fix the shelves with two screws to each; they should be screwed through the back of frame into the back of shelves. The pillars might now be screwed to shelves from the front. As the pillars are screwed on from the front, it will be necessary to hide the screw heads; a small turned button is generally glued on, and answers the purpose satisfactorily. The brackets, pediment, carved fluted panels, &c., might now be fixed. The top ornaments on uprights can be secured with a dowel screw; but in better class work the pin should be turned on the ornaments and inserted in a socket bored for that purpose into the uprights. The details of carving at B, of pediment at A, and of pillar and end view, are shown.

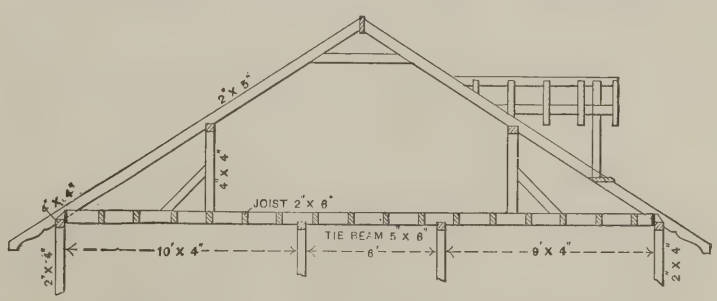
Our next illustration (Fig. 9) is drawn to the same proportions as the first one. It differs only in detail. Instead of a half-circular panel in top division we have introduced a square one, with an oblong piece of carving at each side, or two square mirrors could be inserted instead, and a carved panel between. The enrichment on pediment might be merely incised; but if carved in low relief the effect would be much prettier. The side brackets, it will be observed, take more of the form of a pediment than the ordinary sweep bracket; but one of the same shape as those indicated at base might be substituted if preferred. A small beveled plate could be inserted with good effect in the place of the carved panel immediately above the top shelf. The pattern of pillars which support the shelves is known as the "ball and hollow," or "mock twist." The ball is intended to be beaded, not plain, so



Elevation of Bay Window.



Plan of Bay Window.



Longitudinal Section Through Roof, Illustrating the Framing.

as to be in accordance with the prevailing fashion. If desired, a pillar similar to the one shown in the preceding design (Fig. 8) could, of course, be used.

As before mentioned, the dimensions of our present illustration are intended to be the same as those for Fig. 1; therefore the backings must be got out to same sizes, and the facings glued on. The panels, brackets, shelves, &c, can all be got out and manipulated as before described; the only alteration required is in the shapes of the various details. The same remarks will also apply to our next illustration (Fig. 10). With regard to the design, it will be seen that we have introduced three small beveled plates in top part. Of late it has become fashionable to insert several small mirrors of various shapes and sizes into over-mantels instead of a less number of larger ones. A few small mirrors carefully arranged help to make a job look light and pretty. This is, however, purely a matter of taste. Some persons might prefer a carved wooden panel in the middle and a mirror on each side, whilst others would suggest two carved wooden panels and a mirror between. The panels might either have semicircular tops, or square rounded or canted corners, or, as another alternative, oval-shaped panels might be fitted. If two oblong mirrors in top part were thought sufficient, they could easily be substituted for the arrangement here indicated. With regard to the pediment, either of the preceding designs figured in this or the last chapter could be utilized. Above the middle plate carved oval pateræ and flutes are indicated, which, if nicely done, would add to the effect of the job. We may also mention that two small mirrors might be inserted underneath bottom shelf instead of the one shown, and brackets might be fixed behind the pillars, or to support the shelves, and the pillars dispensed with.

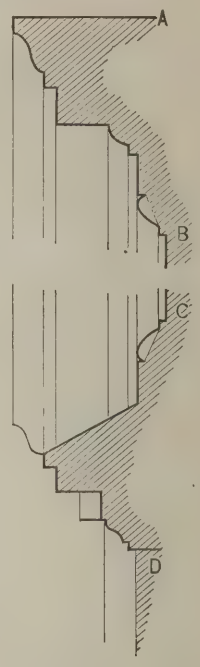
Corrosion of Mortar.

The fact that mortar of old chimneys suffers greatly from the corrosive effect of the creosote of wood soot, was pointed out years ago in this journal. The creosote formed from the slow combustion of wood contains a large proportion of pyroligneous vinegar or crude acetic acid. This acid is formed in large quantities when the combustion of wood is slow and many quarts will be condensed in a chimney in cold weather, where a large wood fire is very much checked. The time required for such a condensation is but a few hours. The acid dissolves lime readily, carrying it away in solution. In this way the mortar is frequently entirely removed from the tops of old chimneys in the country. New chimneys suffer in the same way. Cases might be instanced where the top courses of brick in chimneys but two years old are entirely without support other than that afforded by the sand with which the lime was mixed. Usually bricks can be lifted from the top courses of chimneys with the fingers if the chimney is more than 18 months old.

Where mortar is disintegrated by the creosote, the joint is not left entirely open because the sand and gravel are not easily washed out and are not attacked by the creosote. In time, however, by the action of the wind and the movements of the chimney, the finer portions of the sand are sifted out and the joints are left quite open. In modern houses the danger from this cause is much greater than in houses built 80 or 90 years ago. Then very thick walls were used in nearly all chimneys, many flues were placed in one stack, and the destruction of the mortar in the thick external joints went on very slowly.

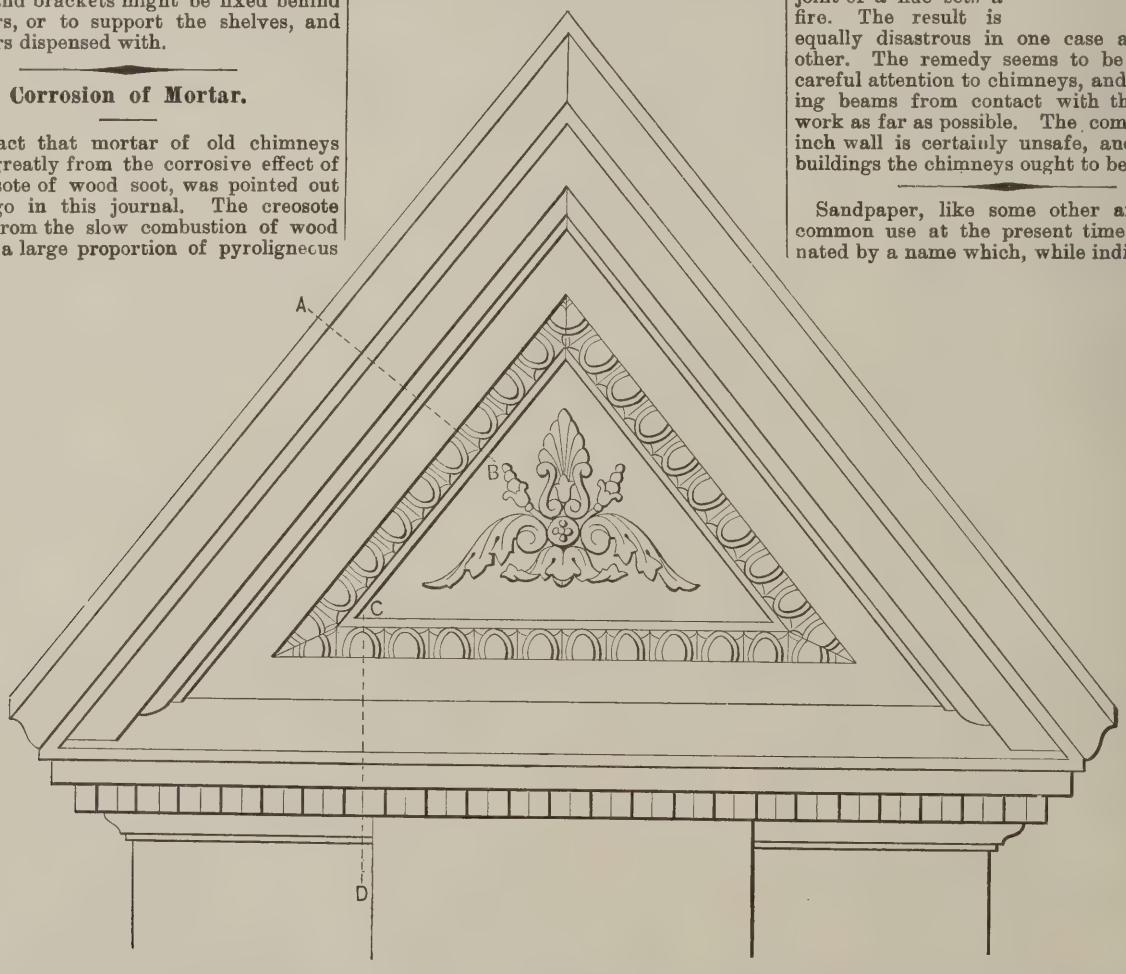
In the thin walls of chimneys as generally built at the present time the corrosive action is much more rapid. If the corrosion went on rapidly and was not retarded as the middle of the joint was reached it would not take more than four years to dissolve all the lime from the upper joints of a chimney with 4½-inch walls. After reaching the depth of an inch the sand does not readily sift out and the joint gets considerable protection from it. Below the level of the roof the chimney is kept warmer, condensation takes place less steadily and depends on these conditions which make the stove-pipe "drip." But it must be acknowledged that in the colder portion of the country the corrosion of the mortar is altogether too rapid, even on the lower floors.

Open chimney joints may, and do, cause fires in two ways. In cold, windy weather "back drafts" may project sparks through the brickwork into contact with the heated and half-charred beams and thus start fires. The other method is a sort of spontaneous combustion, like that caused by steam-pipes. The open brickwork transmits heat readily, and the wood becomes half charred; in this condition it is peculiarly liable to spontaneous combustion, caused by the condensation of oxygen within its particles. In fact, the half-charred wood appears to behave in the same way as charcoal, and to be equally liable to burst into flames. Its point of ignition is usually lowered many hundred degrees. Baked wood is dangerous even when the temperature does not exceed 250° F. This temperature is amply sufficient to completely char ordinary white pine and convert it into a black charcoal. In some places on the Hudson River steamer Drew the inside of the pine and cabinet work near steam pipes had been converted into charcoal perhaps ½ inch deep through years of contact with the pipes. That this wood had not been subjected to a high temperature is proved by the condition of the paint, gilding, &c., on the outer surfaces. It makes little difference in what way the open joint of a flue sets a fire. The result is equally disastrous in one case as in the other. The remedy seems to be in more careful attention to chimneys, and in keeping beams from contact with the masonwork as far as possible. The common 4½-inch wall is certainly unsafe, and in new buildings the chimneys ought to be thicker.



Sections on Lines A B and C D in Gable Shown Below.

Sandpaper, like some other articles in common use at the present time, is designated by a name which, while indicating its character at the outset of its manufacture, no longer describes its actual constituencies. Sandpaper is at present made with powdered glass, instead of sand. Glass is readily pulverized by heating it red-hot and throwing it into water, and finishing the powdering in an iron frame mortar. By the use of sieves of different sizes of mesh



Architectural Sheet Metal Work.—Detail of Side Gable in Galvanized Iron. Residence of Mr. I. L. Baker, Dayton, Ohio.
(See perspective view in Plate XIII.)

the powder can be separated into various grades, from the finest dust to very coarse, and these should be kept separate. A strong paper is tacked down and covered with powdered glass of the desired fineness; when the glue is dry the surplus glass is shaken or brushed off. Muslin is better than paper, and lasts much longer.

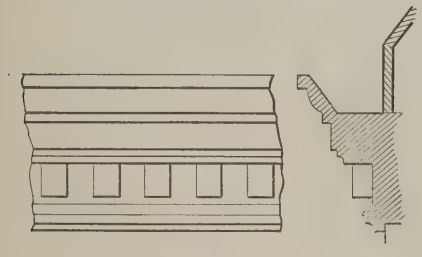
The Economy of Elevators.

In a recent issue of *Stevens Indicator*, a quarterly conducted by the alumni and undergraduates of Stevens Institute of Technology, Hoboken, N. J., Mr. Edward E. Magovern discusses elevators with a view to determining which is the most economical for general use. Some of his deductions are of interest to builders and architects, and accordingly we reproduce his article in full. It is constructed upon such a plan as to be of value in enabling a decision to be reached under special conditions. Mr. Magovern writes as follows:

Architectural Sheet Metal Work.—Galvanized Iron Cresting on Residence of Mr. I. L. Baker.

The elevator systems at present employed in buildings are classified as follows: 1. Steam; 2. Hydraulic; 3. Belt.

The first class includes those in which a steam engine is connected directly, by means of gearing or belting, with the drum upon which the cable operating the car is wound, the engine running, by means of a valve under the control of the operator, only when required to raise the car; and



Main Cornice.

those in which a steam engine is connected by belting running on fast and loose pulleys with the drum upon which the cable operating the car is wound, the engine running continuously, although the mean effective pressure, controlled by an ordinary governor, is reduced when the elevator is not in operation. Frequently an automatic contrivance for reducing the speed of the engine when the elevator is stopped is employed. The engine is used solely for the purpose indicated. These two classes of steam elevators may be classified as: (*a*) Intermittent. (*b*) Continuous.

The second general classification—viz., the hydraulic elevators, are those in which the static pressure or head of water is the source of energy, and is employed in a hydraulic engine. This static pressure may be due to either: (*a.*) The natural head of the fluid, as in the case of many cities where the source of supply is higher than the point where the water is used. (*b.*) The artificial head produced in a city water system by pumping from the source of supply to a higher reservoir, a stand-pipe, or as in the case of the Holly water system, by pumping directly in the pipes. (*c.*) The artificial head produced locally in a building by the use of a steam pump to give head to the water by pumping to an elevated tank, or else to deliver water into the hydraulic engine.

The third general classification—viz., the belt system of elevators, includes those in which the prime mover is of sufficient size to run an elevator in addition to its usual load, by means of shifting belts on fast and loose pulleys. This class of elevators is similar to the continuous steam elevators above described, with the exceptions that there is no direct contrivance for the reducing of either pressure or speed, except the ordinary governor, when the elevator is not in operation, in the motor, and that the motor is used for other purposes beside the elevator. For the sake of simplicity in our consideration of economy, we shall designate the respective classes as follows:

A. Intermittent steam elevators. B. Continuous steam elevators. C. Hydraulic elevators actuated by the head of water derived from a city street system. D_1. Hydraulic elevators actuated by the head of water derived from a local pressure induced by the pumping water to a roof tank. D_2. Hydraulic elevators actuated by the pressure of water pumped into a closed tank. E. Belt elevators.

The economy of the system may be taken as follows: 1. Initial cost; 2, cost of repairs; 3, cost of attendance; 4, cost of motive power, including lubricating, &c.

The following tables are based upon the results of a five years' experience with upward of 600 elevators of standard makes in the City of New York:

Cost of Motive Power.—(Value 100.)

		Comp. figure.
1 minimum	C	8
2 minimum	E	12
3 minimum	D_1	18
4 minimum	B	40
5 minimum	A	60
6 maximum	D_2	100

Interest on Initial Cost.—(Value 33⅓)

1 minimum	E	15
2 minimum	B	45
3 minimum	C	50
4 minimum	A	85
5 minimum	D_1	90
6 maximum	D_2	100

Cost of Repairs—(Value 27½).

1 minimum	C	20
2 minimum	D_1	40
3 minimum	D_2	50
4 minimum	A	60
5 minimum	E	90
6 maximum	B	100

Cost of Attendance—(Value 95).

1 minimum	E	10
2 minimum	B	30
3 minimum	C	50
4 minimum	D_1	75
5 minimum	A	85
6 maximum	D_2	100

Taking the cost of material and other items involved as at the present time in the city of New York, the comparative figures for elevators doing the same work (*i. e.*, of same lift, number of trips per day, and loads lifted) were obtained. Manifestly, the elevator, the sum of whose resultant comparative figures is a minimum, is the most economical. The following table, therefore, gives the most economical elevator when the four facts above are considered:

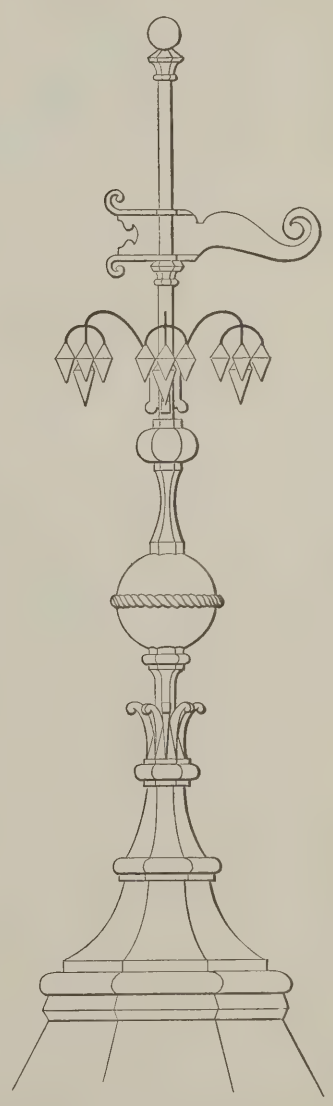
The Most Economical Elevator.

Total maximum values, $33\frac{1}{3}+27\frac{1}{2}+95+100=255\ 5\text{-}6$.

		Comp. figure.
1 minimum	E	51.25
2 minimum	C	77.6
3 minimum	B	111.0
4 minimum	D_1	130.25
5 minimum	A	191.58
6 maximum	D_2	242.08

Other items which frequently affect the decisions are

1. Want of necessary street-water pressure. 2. The requirement of more than one elevator. 3. Smoothness of motion. 4. Comparative safety. 5. Variations of load. 6. Peculiarities of situation, limited room, &c.



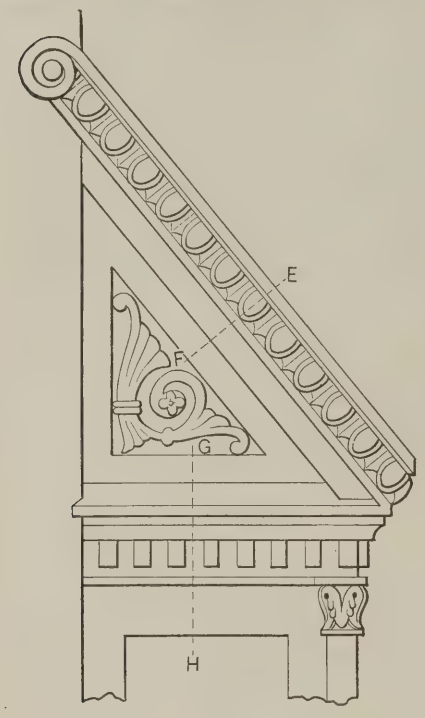
Finial on Tower.

In the buildings which are in process of erection for the American Exhibition, London, various novel features of construction

are being employed. The main hall has a brick front 240 feet long, but the remainder of the building is constructed of iron and glass. The total length of this hall is 1200 feet, and a special feature in its construction is the employment of old rails for the columns, purlins and rafters. The whole of the frame work is thus made out of old rails; the only portions specially made for the purpose being the cast iron sockets for the columns, cast-steel shoes for the connections between the purlins, rafters and columns and the tie bars, which are made of ordinary round iron. The sides of the building are covered with galvanized corrugated iron.

Architectural Sheet Metal Work.

The happy faculty which some designers have for adapting special materials to their needs in the design and embellishment of

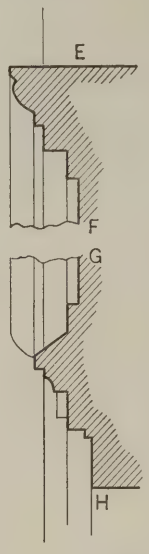


Architectural Sheet Metal Work.—Finish at the Sides of Front Chimney, Residence of Mr. I. L. Baker.

buildings commands attention whenever noticed. A short time since, in visiting Dayton, Ohio, we were struck by the neat and yet appropriate details of the galvanized-iron work used in trimming a residence that was then about completed. The work in question impressed us as being of special interest, because it had been so managed as to lose its own individuality and to blend with the general design. Galvanized-iron details are often incongruous—almost loud in their effect, but in this example they seem to fit, and not to obtrude themselves specially upon the attention of the observer. In Plate XIII we present a perspective view of the house, which has been made from a photograph, and in this and other pages we submit to the attention of our readers details of the galvanized-iron work, and also the floor plans of the building. There is less to be said about the individual details than might be appropriately said about the general composition. It will be noticed that the projections are small, the members simple, and that ornamentation has been sparingly used and yet where employed it is rendered very effective. We lay the study before our readers as an interesting example of the judicious application of galvanized iron in modern architectural work. The design in question was prepared by Mr. Charles I. Williams, architect, Dayton, Ohio, and the iron work executed by Charles Wuichet & Co., of the same place.

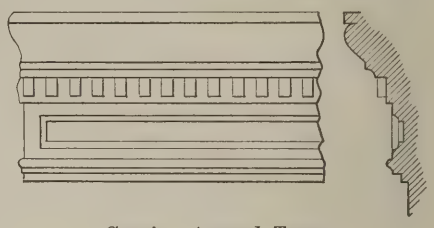
Waterproofing of Wood.

The best plan of waterproofing wood or rendering a wooden vessel waterproof is of importance to many people in different walks of life. Speaking upon this subject an exchange says:



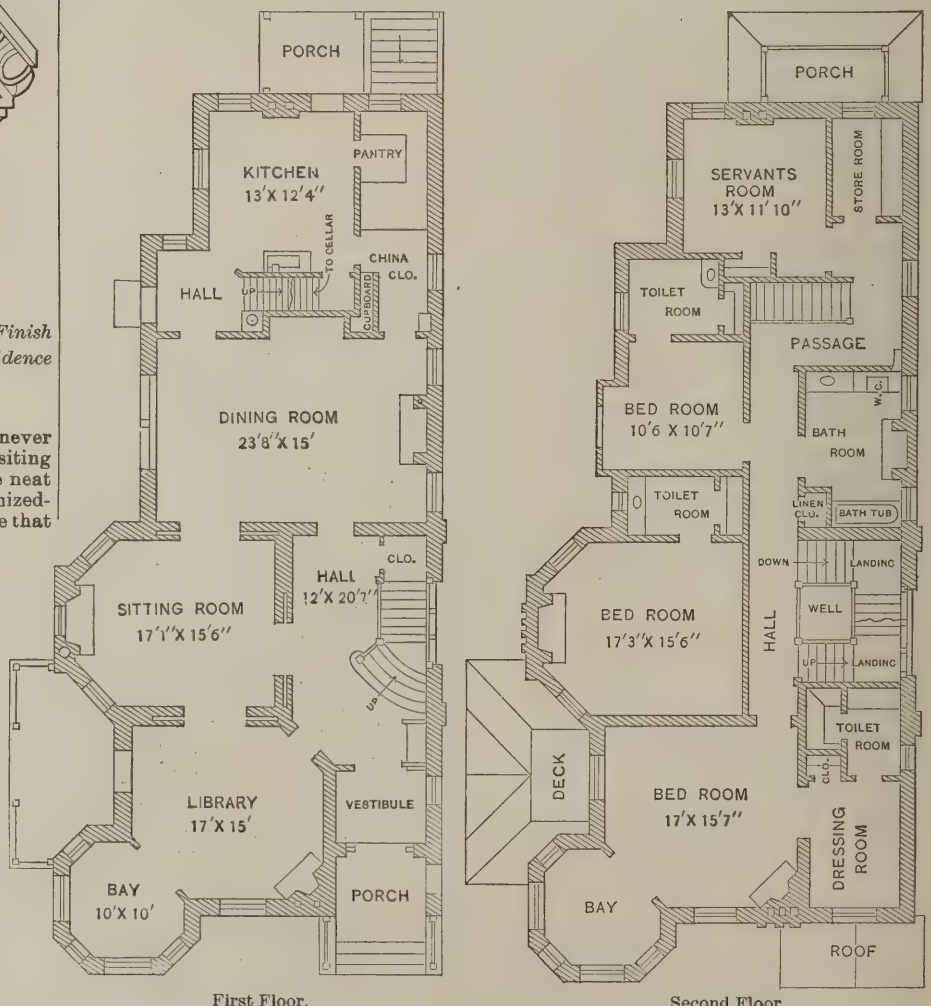
Sections on Lines EF and GH.

Perhaps one of the best linings is asphalt, and the hygeian rock composition has been used with success. A mortar that is said to be waterproof is made with lime slaked with green vitriol instead of water. The quantity of green vitriol is dissolved in warm water, the lime is then slaked in the usual manner and mixed with fine quartz sand. For waterproofing brick walls the following mixture has been recommended: Soft paraffine wax, 2 pounds; shellac, ½ pound; benzoline spirits, 2 quarts; dissolve them by a gentle heat in a water bath, then add 1 gallon of benzoline spirits and apply warm. The mixture is very inflammable and must be kept away from the fire. We may mention here another method of making brickwork impervious to water, known as Sylvester's process, which was used with success on the Croton reservoir, Central Park. It consists in the successive application of two washes—one composed of Castile soap and water and the other of alum and water. The proportions are ¾ pound of soap to 1 gallon of water and ½ pound of alum to 4 gallons of water. The walls should be quite dry and clean and the temperature of the air not below 50° F. The soap wash is laid on first with a flat brush and at a boiling heat. After 24 hours the wash becomes dry and hard, and the alum wash is applied at a temperature of 60° to 70° F. This is allowed to remain 24 hours, when the operation is repeated until the wall has become impervious to water. The number of applications required will depend on the water pressure to which the wall is subjected. In the Croton reservoir case four



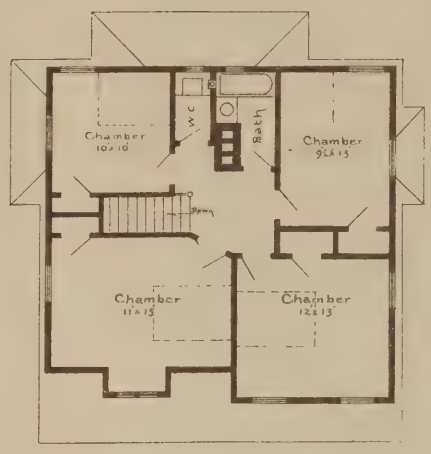
Cornice Around Tower.

coatings were found to render the reservoir free from leakage under 40 feet head. Rosin has been used also as protection against moisture. Five parts of turpentine heated and stirred in 5 parts of common pulverized glue and 1 part of finely sifted sawdust is then applied to the wall, which should be cleansed and heated by means of a lamp, so that the composition may run into every crack and joint. Very often a cement lining is of no use to make a tank water-tight, especially where the bricks and joints are of an inferior description, and the aim should be to get a composition which when heated enters the pores of the brickwork and renders them impervious. The compositions given above have all been thoroughly tried, and found to give the desired results where the conditions were observed.



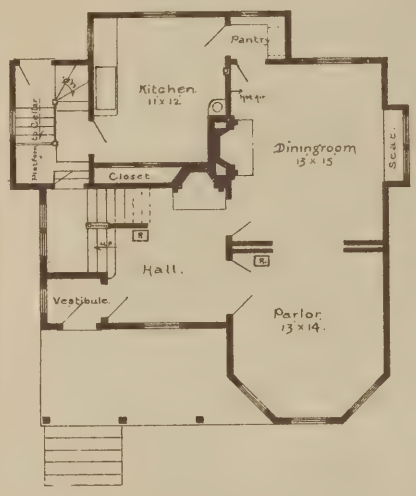
Floor Plans.—Residence of Mr. I. L. Baker, Dayton, Ohio. (See Plate Opposite.—Scale, $\frac{1}{16}$ Inch to the Foot.)

RESIDENCE OF MR. I. L. BAKER, DAYTON, OHIO. CHARLES I. WILLIAMS, ARCHITECT.



Second Floor Plan.

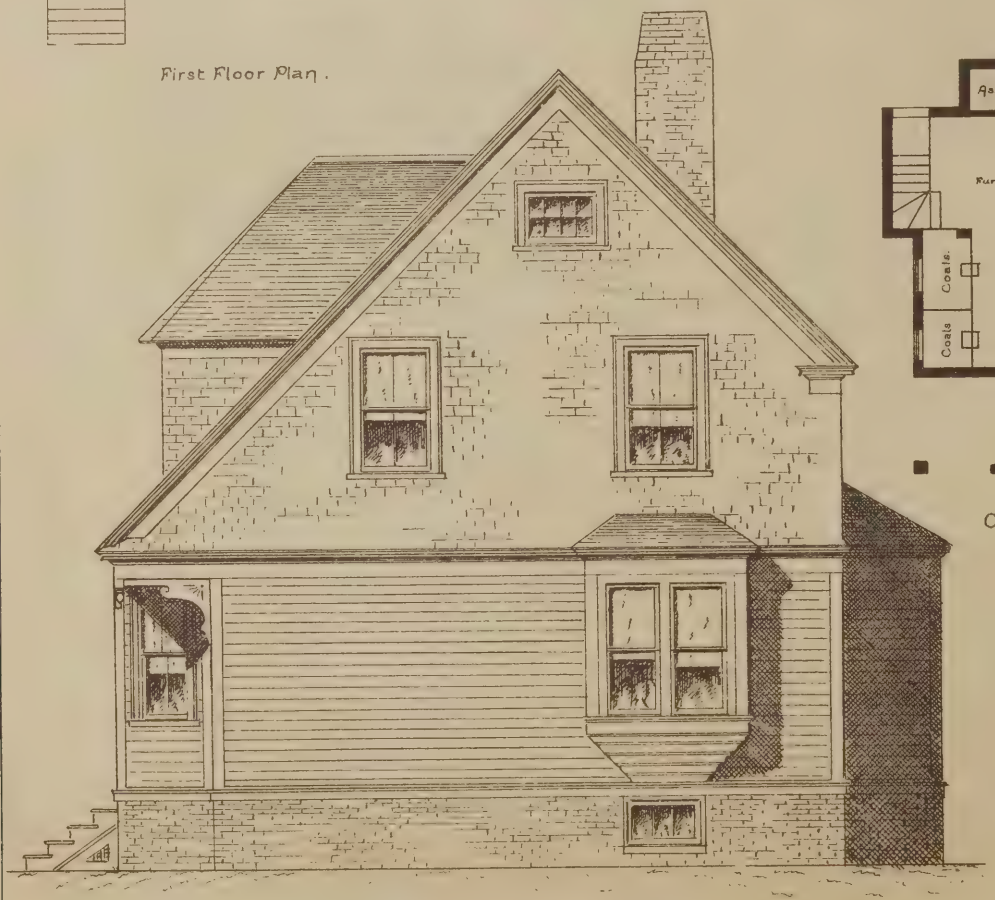
Front Elevation.



First Floor Plan.

COTTAGE DESIGNED BY CHAS. F. CHASE,
PROVIDENCE, R.I.

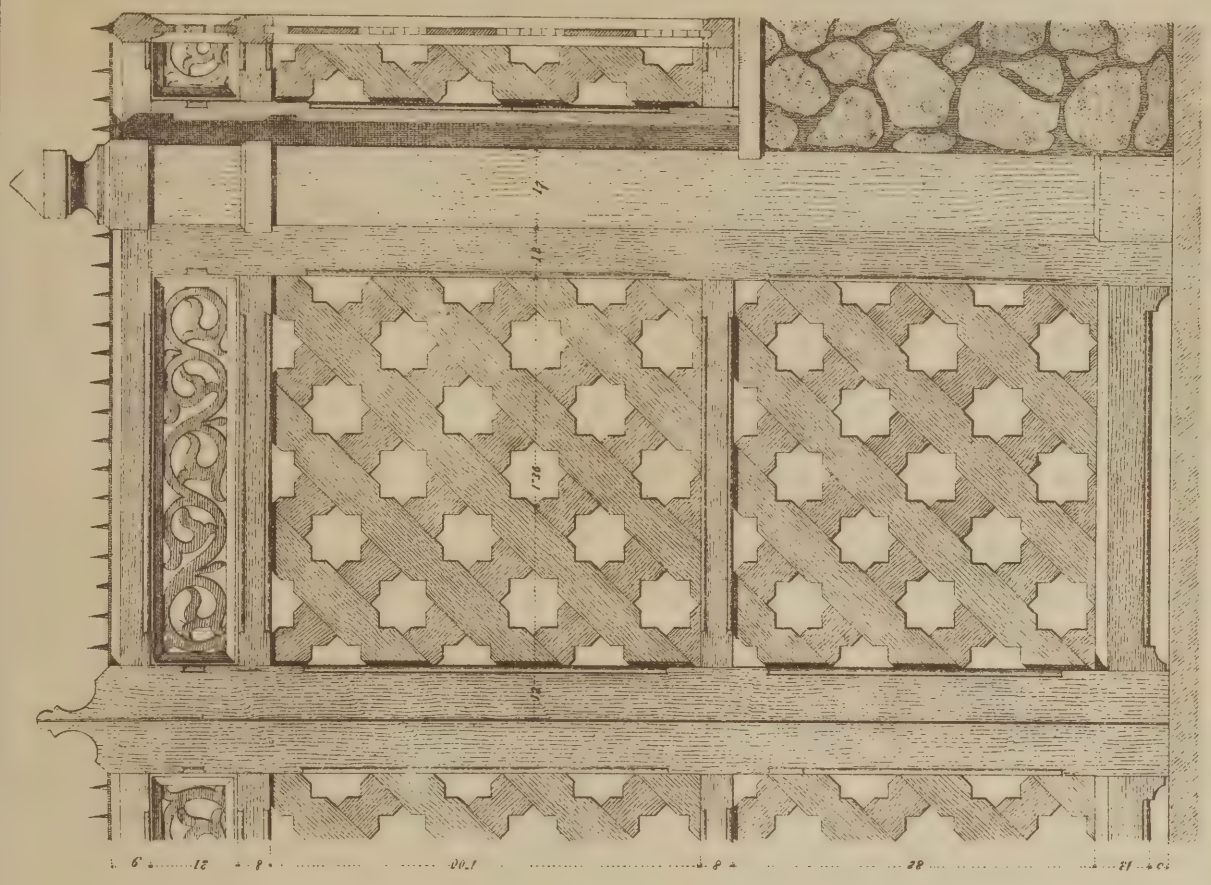
Cellar Plan.



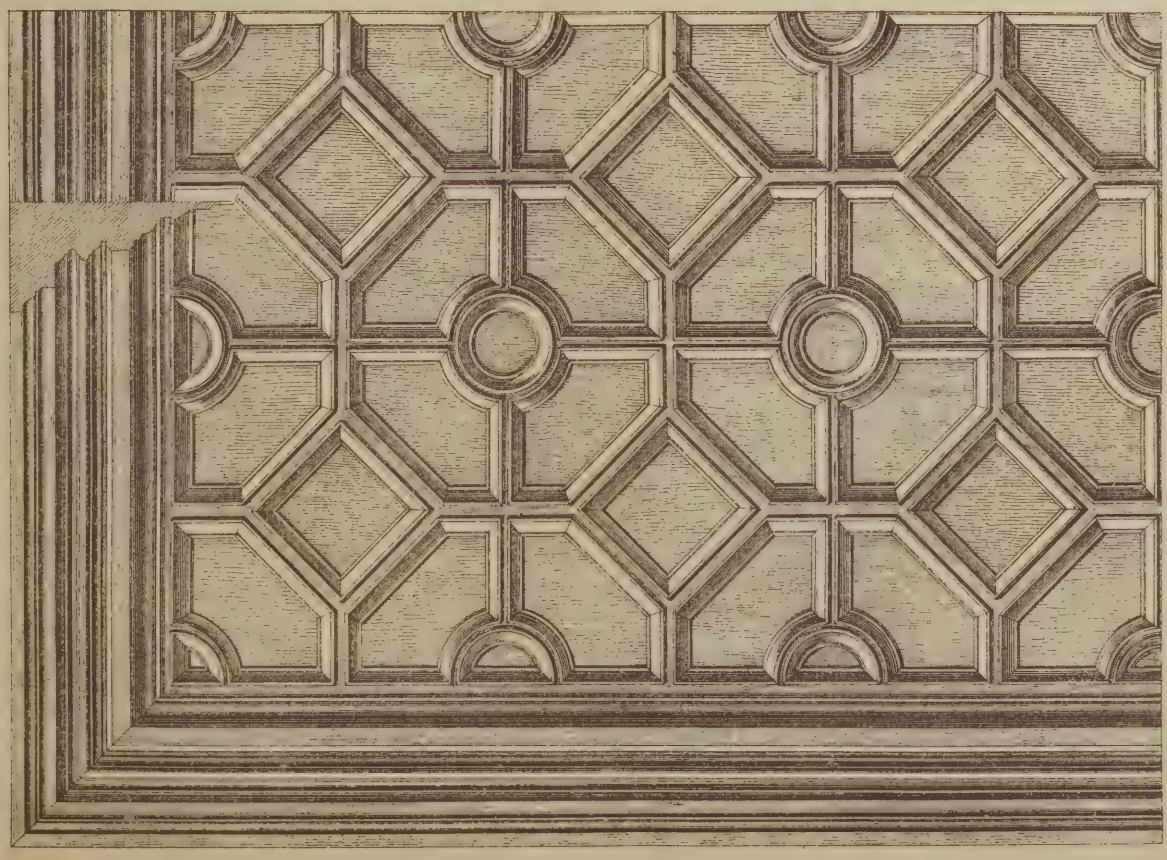
Side Elevation.

ELEVATIONS 1/8 IN. SCALE.
PLANS 1/16 IN. SCALE.

PLATE XV.



DESIGN FOR GATEWAY.



PANELED CEILING IN WOOD.

PLATE XVI.

DESIGNS FOR OVERMANTELS.

See Page 71.

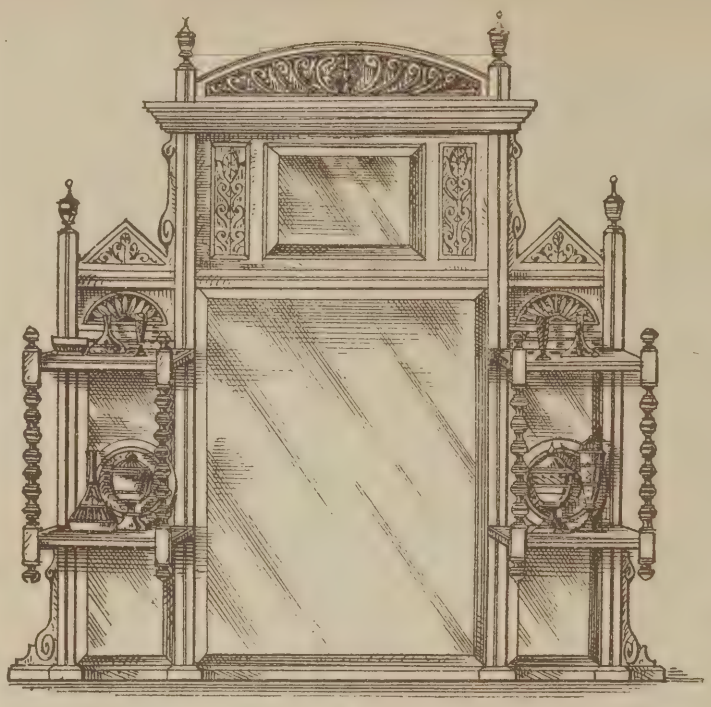
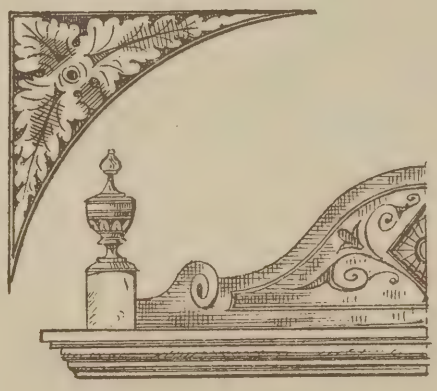


FIG. 9.



DETAILS AT A. & B.

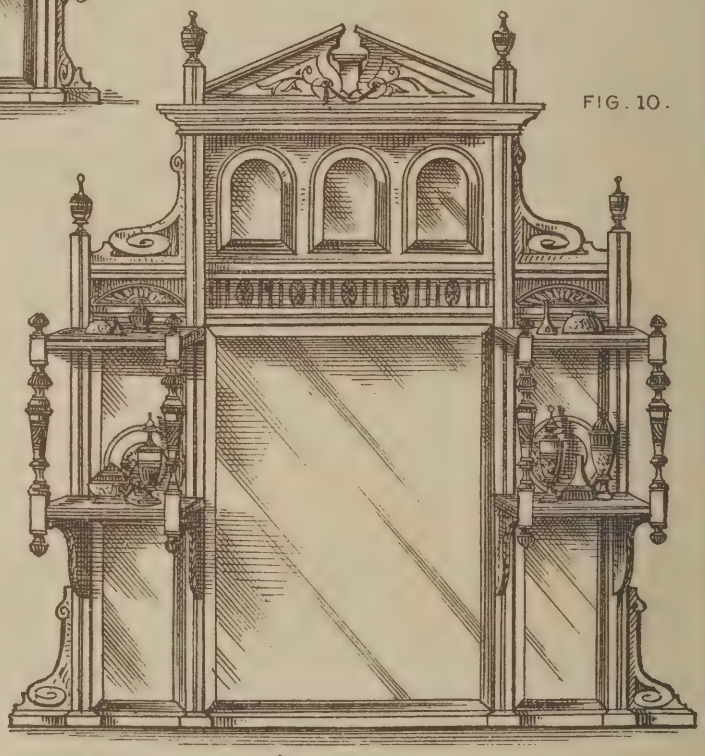


FIG. 10.

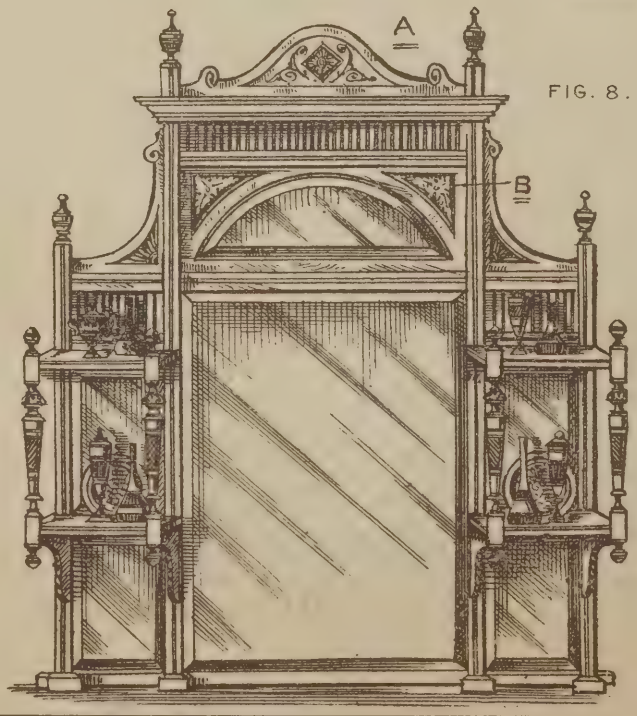
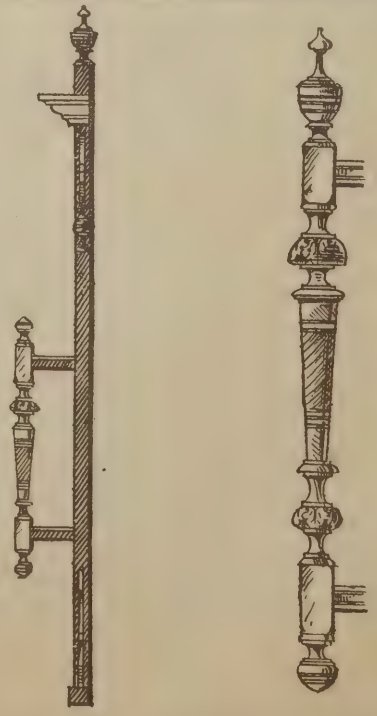


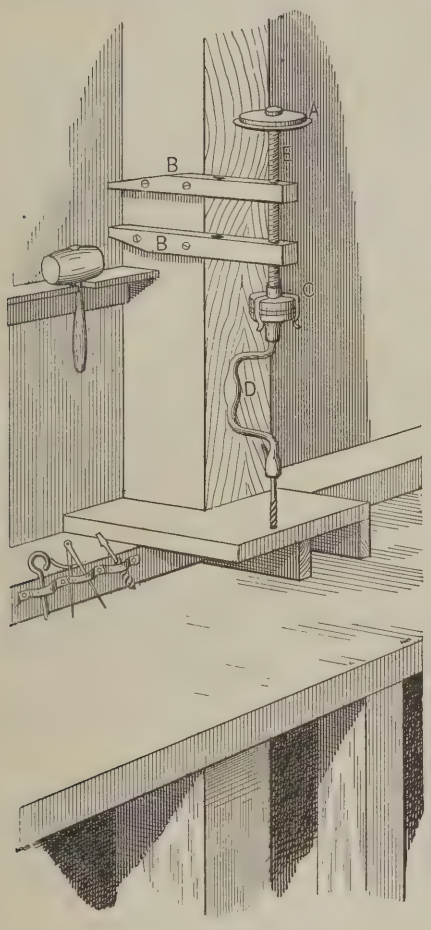
FIG. 8.



CORRESPONDENCE.

An Improvised Drill.

From J. D., *Cleveland, O.*—We were called upon some time since to make a number of ¼-inch holes in ⅛ inch band iron. At the same time we had no press that would do the work, and the cost of an upright drill would have been more than we felt like standing for the purpose in view. Accordingly, we rigged up a contrivance, a sketch of which we send you, that answered very well, and which we think is very likely to be of interest to other readers of the paper. Referring to the drawing, B is a pair of 14-inch screw clamps. C is a tin cap, with brass springs made to receive the



An Improvised Drill.

end of an ordinary bit brace, D. The cap C is attached to the lower end of the wood screw E by a socket and pin. The three springs on the end cap sustain the brace, and yet allow of its easy removal when needed for other purposes. With this arrangement we find it an easy matter with the twist drills now in use to drill through not only the material above referred to, but to as great a depth as 2 inches in cast iron, without causing our breast works to cave in. This was the trouble with the old breast drill in use long ago.

Freezing at the Eaves.

From E D. M., *Northfield, Vermont.*—I desire to know the best way to prevent leaking in a tin roof, caused by water running down from the warmer parts of the roof, and freezing at or near the eaves and then draining back so as to run over the seams. Could tin gutter be placed in the roof so as to work successfully, or might the roof be doubled in a way to overcome this trouble?

Answer.—Our correspondent accompanies his inquiry by a sketch illustrating the trouble, which is one that is common to many houses in many different parts of the country. One of his suggested remedies is a gutter sunk in the roof at the line of the wall and furnished with a drip pipe, extending outward through the cornice so as to throw the water from the building. Our correspondent might have answered his own question so far as concerns the gutter, for it is evident that what would cause the water to freeze on top of the roof would likewise make trouble in a trough and a small pipe. Such a remedy we would regard as being of no use at all. With reference to doubling the roof we do not see how anything is to be gained thereby. What is wanted is to prevent ice forming near the eaves—in other words, to maintain an equitable temperature under the roof. This can be done by features of construction at the time the roof is being built, or it may be accomplished, in part at least, by putting non-conducting material underneath the roof covering; for example, good felt underneath a tin roof. Our correspondent's sketch represents a very flat roof, and the indications are that the difficulty occurs on the north side. If the roof had more pitch it would in a measure free itself.

The Best Drawing Paper.

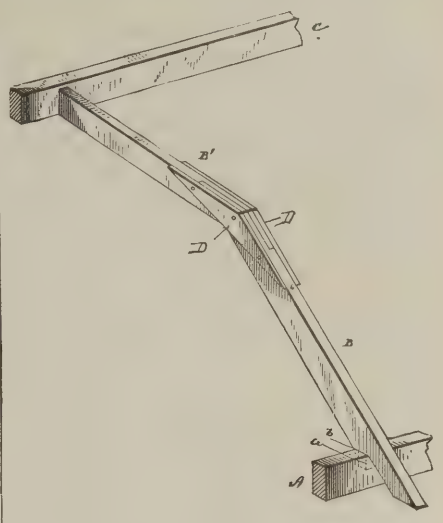
From J. W. F., *Upper Sandusky, Ohio.*—I desire to inquire which is the best drawing paper for perspectives and elevations which are not to be traced.

Answer.—Draftsmen in general have a fondness for Watman paper of the heavier and finer grades for elevations and perspectives, and they seem to use this material irrespective of whether the work is to be traced or not. If the elevations and perspectives are to be reproduced by any of the modern processes of engraving, including photo-engraving, photo-lithography, &c., a hard, smooth surface like that of bristol-board is to be preferred. In such work very black ink should be employed, and care should be taken in proportioning the lines and spaces, with reference to the reduction that is to be made.

Framing a Barn Roof.

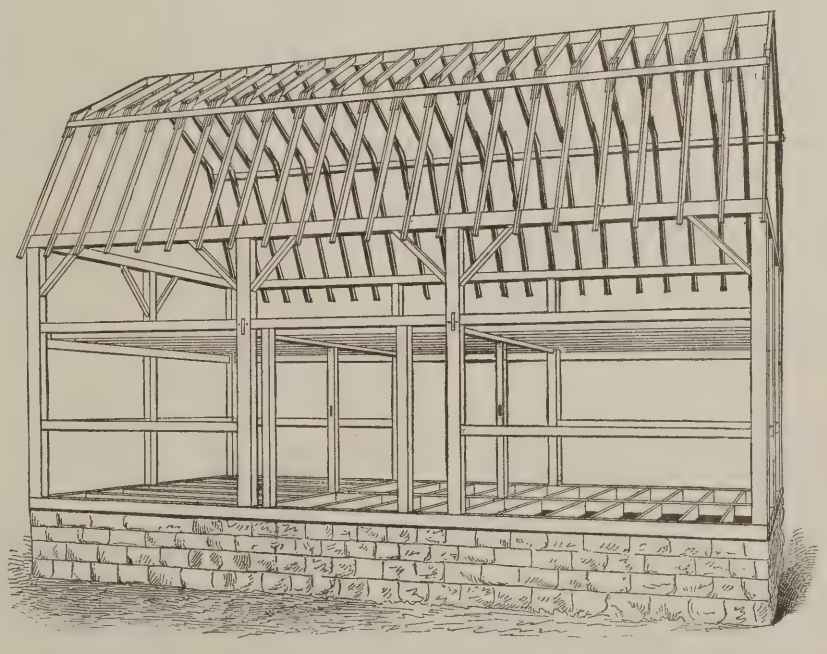
From F. P. J., *Brockport, N. Y.*—I inclose a photograph showing a joint for rafters recently patented by N. S. Davis, of this place. It may be of interest to the readers of *Carpentry and Building*, especially to those who are barn builders by trade. The advantage claimed for the invention is the absence of purlin posts and plates, thereby giving more room and convenience, especially where horse forks and slings are used. The strength of roofs constructed in this manner is unquestioned. There have been 30 buildings built in this neighborhood covered with roofs of this character, some of the buildings being as large as 36 x 80 feet in plan. All these are pronounced by their owners to be entirely satisfactory.

Note.—We have had the accompanying engraving made from the photograph which our correspondent inclosed. We have also reproduced the details presented herewith from the patent drawings. The two will



Detail of Framing. By N. S. Davis.

illustrate to our readers in a very satisfactory manner the features of the roof construction recommended, and will, no doubt, interest a large number.



Engraved from a Photograph of Framing Patented by N. S. Davis.

Smoky Chimneys.

From F. A. S., *Newburg, N. Y.*—In the January number of *Carpentry and Building* I noticed a communication from "F. F.," of Berkley Springs, W. Va., describing his trouble with a smoky chimney. I doubt very much if either the hight of the chimney or the fact of its being situated between two mountains is at all responsible for the trouble. My impression is that the difficulty is with the flue, and that to a certain extent the flue is clogged by brick and mortar. If there is a bend in the chimney it is at this point, no doubt, that the trouble will be discovered if a careful investigation is made. It will cost merely a trifle to ascertain the facts of the case. Attach a weight to a small rope and drop it down the flue. This will discover the obstruction, if any exists. The weight should be 4 or 5 inches in size at the end, and should be from 10 to 15 pounds in weight. In the course of my ex-

perience I have encountered several cases of this kind. In one instance I was obliged to have a cut of about 3 feet made in the chimney breast before we could effectually clear the flue. Whenever I have trouble of this kind I invariably compel the mason to clear the flue and make all the work good at his own expense.

Trouble with Drawing Paper.

From F. B. I., *Kansas City, Mo.*—Your correspondent, "L. D. H.," seems to have trouble with his drawing paper on account of buckling. The best remedy I know of under such circumstances is to cover the drawing with soft, heavy paper, and over it place a spare drawing board. If your correspondent tries this remedy, I think he will be surprised to see how nice and straight his drawings remain.

Plastering.

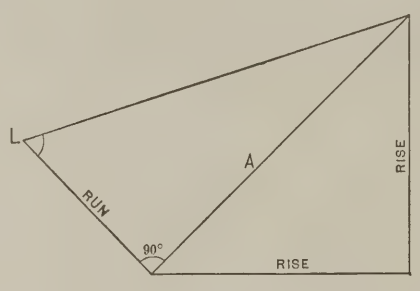
From F. B. I., *Kansas City, Mo.*—I notice in the January number of *Carpentry and Building* the difficulty that "F. B." has with his plastering. He does not state when the plastering was done, whether in cold weather or in the fall before freezing weather set in. If it was done in the fall, and, as he says, is best "drawed" work, it may be that the first coat was too dry, so that when the browning was applied the clinchers broke, with the result as described. On the other hand, if the plastering was done during cold weather, the mortar may have become frozen directly after putting on, and it may not have refloated when it thawed out. In such cases plastering cannot be expected to stand. Still another cause may explain why the plastering fell. A jar would break the clinchers directly after the plastering is put on, and, in time, the plastering would fall by a very slight jar. I have known lime to contain small black or brown specks that burst or chipped the white coat after it was thoroughly dried. I do not think, however, that the raw material was the cause of "F. B.'s" trouble.

From D. W. S., *Fergus Falls, Minn.*—Referring to the communication of "F. B." in the January number of *Carpentry and Building*, and leaving out of the question what may be due to poor materials, it seems to me that the trouble is that the first coat was left too long before the second or brown coat was put on, as in standing one day in drying weather it would get somewhat dried over, so that the brown coat would not adhere to it. In doing this green three-coat work, as it is called, the brown coat should be put on within a few minutes after the scratch coat, and before the latter has had time to dry over. A better way is the regular dry three-coat work, but in that case the scratch coat must stand a week or such a matter and be thoroughly dry before the brown coat is put on, and, of course, in either case the brown coat should be thoroughly dry before the putty coat or hard finish is put on.

From F. A. S., *Newburg, N. Y.*—I will endeavor to explain to "F. B.," whose communication appears on page 13 of the January number, what I feel quite sure is the reason of his plastering falling off from jarring or from some similar cause. In his communication your correspondent says: "The putting on of the scratch coat was intended as green work." Undoubtedly it was green work, whether so intended or not. It was left standing for one day and then the brown coat was put on. I feel very confident that the man, whether architect, carpenter, mason or owner, that ordered the brown coat put on in one day after the scratch coat was put in place is responsible for the whole business. My reason is as follows: It would be quite impossible to go over the scratch coat with a browning after the former was in place, without either breaking the clinches or so seriously impairing them that the plastering would be liable to fall off at any time, especially the work on the ceilings. In regard to the plastering separating—that is, the browning coming off from the scratch coat—I would say that the browning was put on in so short a time after the first coat that as soon as the trowel was applied with the brown mortar the scratching was all rubbed down, leaving no support for the brown coat.

Cutting Brace Timbers.

From F. L., *San Francisco, Cal.*—I submit to you the following useful problem not to be found in any books on such subjects in this city. Given the run and rise of a brace of square timber which stands with one edge forming a ridge line, causing the cross section of the brace to be diamond shaped. Required the cuts for each end, the blade of the bevel to be applied to the two faces adjacent to the ridge line. This brace has not any relationship to a hip-rafter. If this brace be cut and turned bottom edge up we



Cutting Brace Timbers.—Fig. 1 of Diagrams Accompanying Letter from F. L.

have before us a figure resembling a hipped roof, with common rafters standing at an angle of 45°. Results of the solution:

l = angle of the lower bevel.
u = angle of the upper bevel.

$$\text{Tan. } l = \frac{\text{rise}}{\text{run. sin } 45^\circ} = \frac{\text{rise } (2)^{\frac{1}{2}}}{\text{run}}$$

$$\text{Tan. } u = \frac{\text{run.}}{\text{rise. sin } 45^\circ} = \frac{\text{run. } (2)^{\frac{1}{2}}}{\text{rise}}$$

To express these equations geometrically, draw to as large a scale as possible two sets of right-angled triangles; thus: At point L is the angle of the lower bevel. At point U is the angle of the upper bevel. Mark on drawing the lengths of the lines opposite to the angles and adjacent to the angles. We may copy either angle with a steel square; thus: Place the side opposite to the angle on the tongue. Place the side adjacent to the angle on the blade. Mark a line along the blade. With a set-bevel take

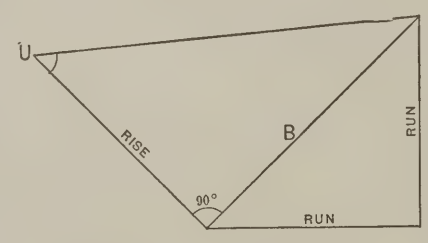


Fig. 2 of F. L.'s Diagrams.

off the acute angle made by this line. Apply the stock of the bevel to the ridge line two ways as required by the conditions. Having a guide for the direction of the cut, it is not necessary to mark the lower half of the stick, but it can be done by reversing the direction of the stock of the bevel and applying the stock to the lower edge.

Making Mortar.

From L., *Bloomington, Ill.*—I have been reading the article in the February number of *Carpentry and Building* about mortar. To my mind, your correspondent "C. W. B." has not explained how mortar should be made. The mere matter of slaking the lime does not make mortar out of it. Lime and water alone will not make any better mortar than sand and water. This is my judgment after 36 years' experience. I use plenty of water in slaking the lime, so that when it is run out of the box into the bed it will not bake or burn, as it is liable to do if not well watered. The mortar bed should be made tight. Run out 25 barrels or more of lime if you have room for it and need it. Put in the hair in the large bed. Then put in 50 yards of good sand and mix well. Mix so that the sand can take up the surplus water. When it has been worked, say 10 days or more, you can work in from 25 to 50 loads more than you have in. The water that raises on a bushel of lime slaked in a cask, and where plenty of water is used, if removed and put on good sharp sand will make a better stone than lime and sand mixed. This shows to me plainly that the water should be retained in the lime and sand at the time it is fresh, and that the mortar should be tempered in its own liquor. The fact to which I allude above was, I believe, tested in the building of Fort Sumter.

A Question of Acoustics.

From F. P. S., *Hamilton, Ohio.*—One of the church societies of this town has an audience room 72 feet long by 41 feet wide by about 22 feet high. At present the pulpit is at the end of the room, and the acoustic qualities of the room are good. Owing to an adjoining building being put up recently that darkens one side of the room, the congregation desire to turn the pulpit to the side and insert windows in the two ends. The question is, will this change the acoustic properties of the room?

Answer.—Unless our correspondent has omitted some important condition in the question, we would suppose that there was no difficulty in the way of doing what is proposed. The best way to determine the matter, however, would be by actual trial. We understand that the only changes that are contemplated are moving the pulpit from the end to the side of the room, and putting in windows in the end to afford light in place of those in the side wall shut up by the new building. The new windows are not likely to make any difference in the acoustic properties of the building, and it would be a simple matter, we think, to arrange a temporary rostrum on the side of room, and make an actual test in order to see whether the acoustic properties remain the same with the location of the speaker changed.

Condensation from Metal Roofs.

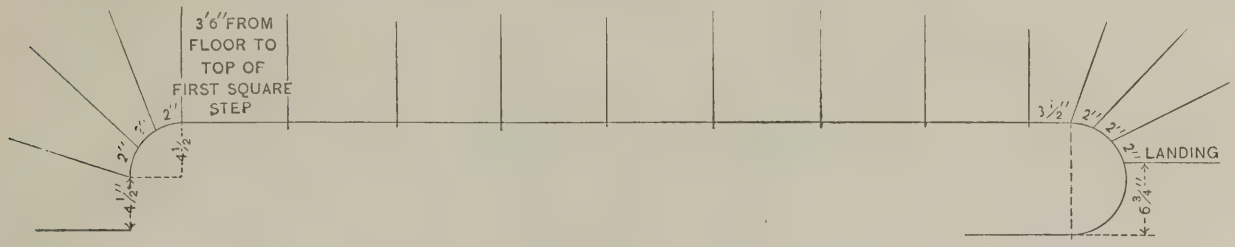
From Y. P., *Pullman, Ill.*—I have noticed several remarks about condensation from tin roofs. This difficulty may be overcome by lathing and plastering against the rafters of the building.

Note.—The plan suggested by our correspondent depends for its success upon a principle that will be readily understood by our readers. Lathing and plastering on the underside of the rafters would form air spaces under the roof which would cut off the possibility of the moist air of the building condensing against the cold surface of the metal. As we suggested in a note a short time since, appended to another correspondent's letter, the same result is possible of accomplishment by the use of building-paper attached to the lower side of the rafters. No doubt the lathing and plastering would make the better job of the two.

Clapboard vs. Siding.

From C., *Waveland, Ind.*—Acting upon the suggestion made in the February number of *Carpentry and Building*, I would say in reference to clapboards and siding that I have often been mystified by these terms in the descriptions of buildings. Custom in this vicinity has made a law, so far as my knowledge extends, that is recognized by builders generally. When "weather boarding" is spoken of, it means boards thick on one edge and thin on the other, overlapping and nailed to studding and lining horizontally. Other boards of special pattern and nailed the same way, we call "drop siding." By the term "siding," we understand boards nailed to sill, ties and plate vertically, with or without battons over the cracks. "Clapboards" invariably mean roof covering split from oak timber with a

frow. Now, somebody in all probability will not know what a "frow" is, and therefore it may be explained that it is an instrument for splitting timber in this general way. The clapboards are 24, 30 or 36 inches long, ½ to ¾ inch in thickness, and 6 inches wide. They are nailed in place, and show



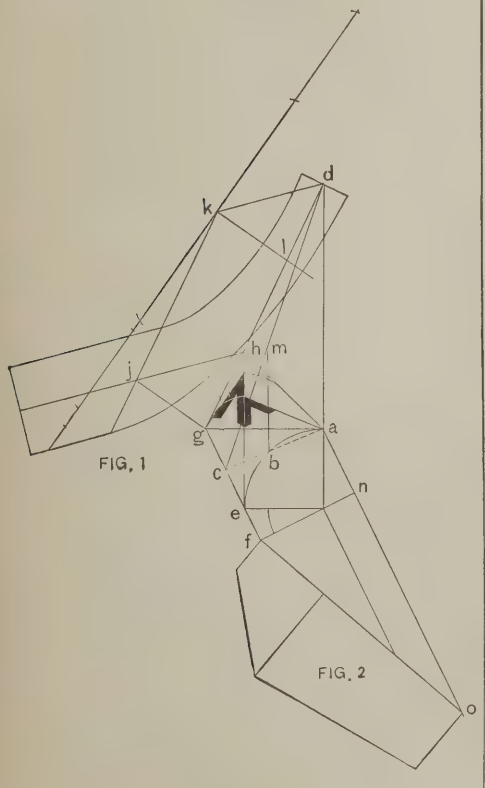
Questions in Stair Building Proposed by H. B. O.—Scale, ¾ Inch to the Foot.

from 8 to 12 inches to the weather, according to their length. If, in the manufacture of clapboards, they are draw-shaved thin at one end, then we change the name again and call them "shaved boards." I am aware that this usage of terms is not universal, and I do not assert that it is correct, but what I have written is the understanding of terms in this vicinity.

Questions About Hand-Railing.

From H. B. O., *Oskaloosa, Iowa.*—I hand you herewith a plan of stairs for which I was called upon to construct a hand-rail. I will be glad to learn how the readers of *Carpentry and Building* would manage such a case as this. The stairs were put up by a contractor and builder with whom I am well acquainted. He and a workman did the work, but the construction shows that the builder is entirely out of his element when he undertakes to construct winding stairs.

In the October number of *Carpentry and Building* I notice a new system of hand-railing by Mr. Perry. I would like to know if the following explanation of his method



Figs. 1 and 2 Referred to by H. B. O.

is correct: Draw the plan. From this draw the elevation of stairs and draw the curve for the center line of rail. Three points are taken in each quarter circle, one at each end and one in the middle. From those points on the plan square up to cut the curve line of the rail. This fixes the hight and position of points in the elevation. To draw the face mold (see Figs. 1 and 2 of drawings inclosed) draw quadrant of center line of rail through the middle B Draw A B extended. Make A D equal to 3–5 on the elevation, as shown on page 193 of *Carpentry and Building* for last year. From B set up B M, equal to 4–5 on elevation. From D draw through M, cutting A B at C. Join C E. Extend C E to cut at G. Draw G D. Square up E H. Join H A, with H and G as centers and H A and G E as radii. Make an intersection at I. Draw I K parallel with G D. Draw D K parallel with H I. From K draw K L parallel with G I. This is the minor axis. Draw through K. Square with K L for the major axis. Strike the mold with trammel or string. It would be simpler and quicker to dispense with the triangle G A D, and to draw the mold as shown at Fig. 2. Fig. 3 shows the tangents unfolded. As I understand it, the bevels shown on the elevation are to apply to face of plank to make butt joint with curve. A joint square or butt with curve must be square with the tangent to the curve at that point. A line bisecting the angle B A C is square with such tangent. As neither the planks nor the tangents are curved I conclude that the bevel shown at A, Fig. 3, is the proper one to apply to the face of the plank for a butt joint. The plumb bevels, which seem to be found in the usual way, will apply only to a cut square with the tangents and face of the plank. Right here I wish to ask, How does the author get over this difficulty? I presume a bevel can be found that will fit, but is not this use of tangents a "stunner" to those of us who have taken Riddell for law and gospel on such matters for 25 years past? It fairly knocks the props from under us and leaves us floundering in the dust. Just look at those tangents! The lower end will have to be doctored to bring it level, and the upper end must have a slice taken off the upper side to bring it in the line with regular pitch, and the middle is in a worse fix than the ends. I would like to know if we are to allow our hitherto decent and well-behaved tangents to go rambling about in this way. Why, it is perfectly absurd! I am not going to say it is not right, for no doubt Mr. Perry can show us how to get over all these difficulties, and with plenty of thicknesses of stuff, he can, no doubt, get out a very decent rail. I am disposed to say that it is a system founded on no system, and what I have shown proves conclusively that there are cases in hand-railing where the workman must, in a measure, cut loose from all systems and be guided by his own skill and judgment. I notice on the joints on the molds, pages 192 and 193 of *Carpentry and Building* for October last year, are not square with the tangents on the lower wreath; they are parallel with the opposite tangents. On the mold for the upper wreath the joints are made differently. I ask, Is the plank to be cut square on these lines? No doubt, I shall expose my ignorance by these questions as to the drawings I have submitted; however I shall have good company in so doing, for this is nothing more than many others have done in the past.

Note.—Our correspondent evidently intends what he has submitted, both in the way of drawings and description, to call out discussion upon the part of the stair builders and hand-railing men among our readers. We submit it for the attention of our subscribers in general. If Mr. Perry should think fit to defend his system, or if any of our readers, wherever situated, have anything to say upon this subject, it will give us pleasure to publish the communications that may be forwarded for that purpose.

Liquid Glue.

From H. M. B., *Phelps, N. Y.*—Will you please inform me how fish-glue or isinglass is dissolved to make liquid glue of a good quality?

Answer.—The following formulæ will, we think, supply the information our correspondent asks for: Dissolve 3½ ounces of ordinary gelatine in a mixture of 1 pint of water and ¼ ounce of crude oxalic acid, and keep the solution five or six hours in a

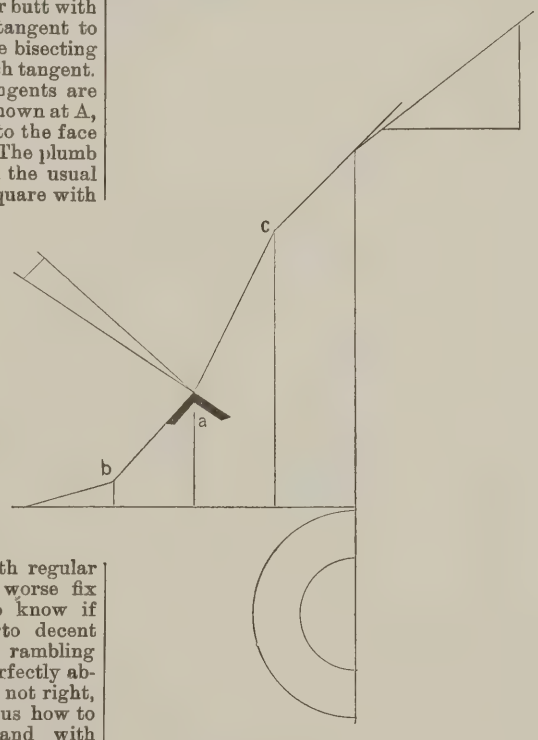


Fig. 3 of Diagrams Referred to by H. B. O.

flask on a water bath. It is then poured in a porcelain dish, diluted, neutralized with calcium carbonate, filtered, and evaporated at a moderate temperature. The quantity of glue obtained by this process will be about double the quantity of the gelatine used. It is very clear, slightly colored, and is said to be very tenacious. A second method of making liquid glue is as follows: Soak the glue in water, then melt at a moderate heat and add strong vinegar until the solution remains a thick fluid when cool. Add a small quantity of acetic or nitric acid, which will keep it fluid at an ordinary temperature until the acid evaporates. Receipts from another source are as follows: First, soft water, 1 quart; best pale glue, 2 pounds; dissolve in a covered vessel by the heat of a water bath; after cooling, add with caution 7 ounces of nitric acid; when cold, bottle off. Second, white glue, 16 ounces; dry white lead, 4 ounces; soft water, 2 pints;

alcohol, 4 ounces; stir together and bottle while hot. Third, 3 parts glue broken into small pieces should be covered with 8 parts of water and left to stand for some hours; ½ of hydrochloric acid and ¾ of sulphate of zinc must then be added, and the whole exposed to a temperature of 185° F. during ten or twelve hours. Allow the compound to settle.

Position of Ventilators.

From L. F. L., *Brattleboro, Vt.*—I desire to get the opinion of some of my brother builders in regard to the position of ventilator openings. Is the proper place for them at the bottom of a room near the floor, or at the top near the ceiling? I am just finishing a house, and the owner has insisted upon my putting all the ventilators within 10 inches of the floor, much against my judgment, for I claim that they should be near the ceiling.

Note.—Our correspondent's request is for advice from his fellow builders in the trade. While referring the question to our readers for discussion, we will merely say that the position of the ventilators depends in some measure upon the system of ventilation that is to be used in the building, and also upon the plan of heating. Ventilators placed near the ceiling carry off the foul and vitiated air which rises to the top of the room. On the other hand, openings made near the floor leading to a heated flue, or drawn upon by mechanical means, can be made to draw off the cold air near the floor. It would seem difficult to give a positive answer to this question, one way or the other. Either plan may be right, and either may be wrong, according to attendant circumstances.

Paint for Tin Roofs.

From W. A. H., *Elba, N. Y.*—As a favor to a reader of *Carpentry and Building*, will you please give your opinion as to the best paint for a tin roof?

Answer.—This question has been replied to many times in the past. That paint is best for a tin roof which has the most body of oil to the smallest amount of pigment, and is yet so constituted as to apply well and adhere closely to the surface. The oil is the protective medium in paint, and the paint should be so managed as to form an oil skin over the surface to be covered. So much for the theory. As to the best paint for the purpose in actual use, it is very hard for us to assert. We have more faith in some of the special roofing paints, prepared by leading paint manufacturers, than we have in iron oxide paints, which are very largely used by the trade in general. Irrespective of the merits of iron oxide as a pigment, it is a well-known fact that it requires the smallest amount of oil to the largest amount of dry paint, thus reversing the general conditions named above. This said, however, it remains that some of the oxide paints manufactured at the present time are far better in quality than those used only a short time since.

REFERRED TO OUR READERS.

A Question in Hand-Railing.

From APPRENTICE, *Peterboro, Ont.*—Will some of our handrailing friends in *Carpentry and Building* show me how to get tangents and angles between them, and also show me how planes are turned into the plan? I have "Hand-railing." by Cresswell (a volume of "Cassell's Technical Manua's"), but I do not understand pages 21 and 22, so far as they relate to the above.

Inlaying for Tool Chests.

From B. N. M., *Washington, D. C.*—I would like to see published in *Carpentry and Building* a drawing showing the dimensions of a carpenter's tool chest. I wish to build such an article, and desire to inlay part of the inside tills or drawers. The chest is to be kept in the shop most of the time, and the outside is of no particular consequence. It will no doubt be marred, but I want the inside to be attractive, and at the same time a creditable piece of work. At the same time I do not wish to spend too much labor upon it. If any of the readers of the paper can give me hints in this matter they will confer a favor.

Tool Boxes.

From T. B., *Headingly, Man.*—Will some of the readers of *Carpentry and Building* kindly give me a plan of constructing a carpenter's tool box. I want something that will hold the necessary tools for a common house-carpenter, be neat in appearance and convenient in use. I want something that will keep the tools from shaking about when moving from place to place, as country carpenters are compelled to.

An Analysis of House Plans.

The principle of analysis has been applied to almost every question that comes up in practical life. There are very few of the sciences that cannot be better presented by analysis than by any other means. It has remained, however, for a writer on modern architecture to present an adequate analysis of the house plan. In a recent issue of our contemporary, *Building*, Mr. C. Francis Osborne, in the course of one of the chapters of a serial entitled "Notes on the Art of House Planning," presents an analysis of the house plan, in which we think many of our readers will feel an interest. Accordingly we present it herewith. In his preliminary remarks, the author makes reference to the desirability of taking a bird's-eye view of a house plan as a whole, and then continues:

If we carefully consider a series of well-arranged house plans we shall find that, however much they may differ in matters of detail, or in the accommodation offered, they will one and all readily yield to a certain system of analysis, and that when we have carefully differentiated the functions of the various divisions of the plan we may easily reach conclusive results, somewhat as follows: We shall see, first, that almost every plan is made up generally of two classes of divisions. The first consisting of those separate parts of the plan in which the persons sheltered by the house live, work or sleep, and the second of those other parts or divisions of the plan which serve for purposes of communication between the living, working and sleeping apartments. The first class we call rooms, and the second thoroughfares. Now, as to the rooms we shall see that they are also amenable to further classification. First, there are those rooms which are used exclusively by the family, and which we may therefore call the family rooms, and, secondly, those rooms used by the servants, either in performing the service of the house or as their own private apartments. These, therefore, we will call the servants' rooms. The family rooms, again, may, according to their use, be further classified as public and private, the principle of this distinction being that those rooms which are open to all members of the family on equal terms are to be classed as public, and those which are for the exclusive use of one or more members only, to the exclusion of the rest, except through the formality of knocking to obtain admission, would be classed as private. So, too, with the servants' rooms; those used in the service of the house being classed as service rooms, and those for the servants' exclusive use as private.

The thoroughfares, too, may be divided in the same way. For we will readily see that some of them are for the family only or principally, while others are for the servants only or principally, and we may so classify them. We will therefore find that if we take first the principal rooms which are usually to be found in houses (though not all of them necessarily in the same house), and arrange them in accordance with the principles here suggested, and the thoroughfares in the same way, the whole will group together in a tabulated form, somewhat as follows:

Analysis of the House Plan.

- **THE HOUSE.**
  - Rooms.
    - Family
      - Public: Reception-room (Pu.). Parlor (Pu., Pi.). Drawing-room (Pu., Pi.). Library (Pu., Pi.). Billiard-room (Pi.) Picture gallery (Pu.). Dining-room (Pu., S.). Verandas. Etc.
      - Private: Study (Pi.). Boudoir (Pi.). Bed-rooms (Pi.). Dressing-rooms (Pi., S.). Bath-rooms (Pi.). Verandas. Etc.
    - Servants
      - Service: Kitchen (S., Sp.). Pantries (S.). Laundries (Sp.). Dairies (Sp.). Store-rooms (S., Sp.). Etc.
      - Private: Servants' hall (S., Sp.). Servants' bedrooms (Sp.). Servants' bathrooms (Sp.). Servants' verandas.
  - Thoroughfares.
    - Family
      - Public: Principal porches. Vestibule. Entrance hall. Inner hall. Etc.
      - Private: Family stair hall. Family corridors. Etc
    - Servants
      - Service: Between family and service rooms.
      - Private: Between servants' rooms, or servants' and service rooms.

Note.—Letters in brackets indicate the proper thoroughfares upon which the room should be found; where two thoroughfares are indicated the room may or should be upon both; Pu., public family; Pi., private family; S., service; Sp., servants' private thoroughfares.

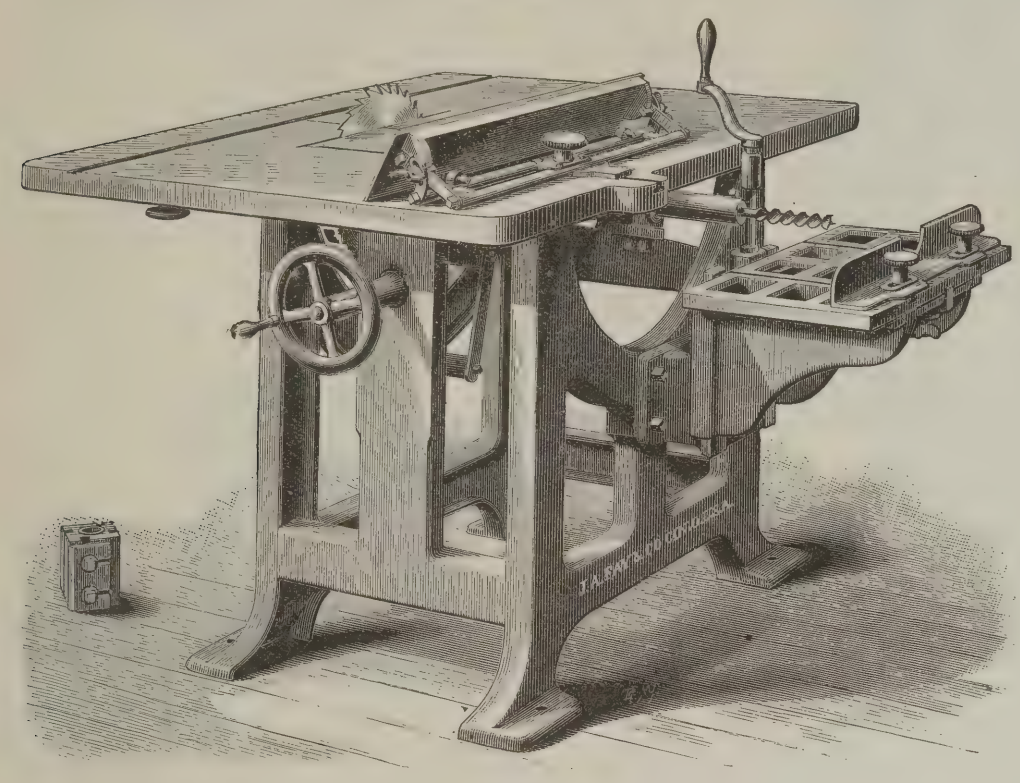
This table will be found useful, not only as giving a clear idea of the general house plan in the abstract, but also as a test whereby may be tried any desired plan. For, although circumstances may arise in which some deviations may be necessary, the principle upon which it is based is correct and its application general.

The building report of Pittsburgh for the year 1886 presents some interesting statistics. The total number of brick buildings erected during the year was 568, and of frame buildings 847, making a total of 1415. The total cost was $2,352,945. Concerning the building work, it is asserted that the effect of the strike in Pittsburgh was to diminish the building done last year by at least $750,000. The building operations for 1886 were a little less than for 1885. The present outlook is said to be very favorable.

NOVELTIES.

New Universal Ripping and Cutting-Off Saw.

Figure 1 of the engravings represents a New Universal Ripping and Cutting-Off Saw that has recently been put upon the market by J. A. Fay & Co., of Cincinnati. This tool has been designed to meet the requirements of those who desire, at moderate cost, a machine adapted to a variety of work and occupying small floor space. The makers assure us that the tool is accurately displayed in the engraving. It is of interest to the manufacturers of furniture, brackets, builders' trimmings, and to all general workers in wood. In the casting of the iron frame the metal is so distributed as to secure the greatest possible strength. The table is likewise of iron, and a recess is planed out over the saw arbor fitted with a supplemental table or slides that are adjustable to and from the saw arbor, admitting the use of heads for jointing, rabbeting, surfacing, grooving, &c. One of these slides is adjustable vertically by means of set screws independent vertically and laterally adjusting table, and the necessary fence for straight or radial boring. The makers state that the machine is adapted to ripping, cross cutting, miter sawing, jointing, surfacing, taking out of wind, squaring up, grooving, gaining, rabbeting, tenoning, raising panels, boring, routing, and a variety of other work by the substitution of different heads and attachments.



Novelties.—Fig. 1.—New Universal Ripping and Cutting-Off Saw.

Crown Porcelain Bath.

E. Aspinwall, Nos. 98 and 100 Beekman street, New York, is directing the attention of the plumbing trade to a kind of sanitary earthenware known under the general trade-mark of "Crown." The accompanying engraving, Fig. 2, represents one article of this line, and is described as the Crown Porcelain Bath. It is molded and glazed in one piece, and is manufactured in several different sizes and finished in different styles. Speaking in general terms of the Crown porcelain ware, which is imported, the circular before us states that it is unsurpassed by any other manufacture, and has the finest form of color and glaze. The ware is recommended on account of being non-absorbent, and for this reason cannot imbibe any impurity or convey infection, and at the same time can be made perfectly clean by wiping with a sponge. Baths of this kind are almost as cheap as many of the metal-lined articles in the market, and the fact that they are coming into very general use speaks well for the appreciation of the public.

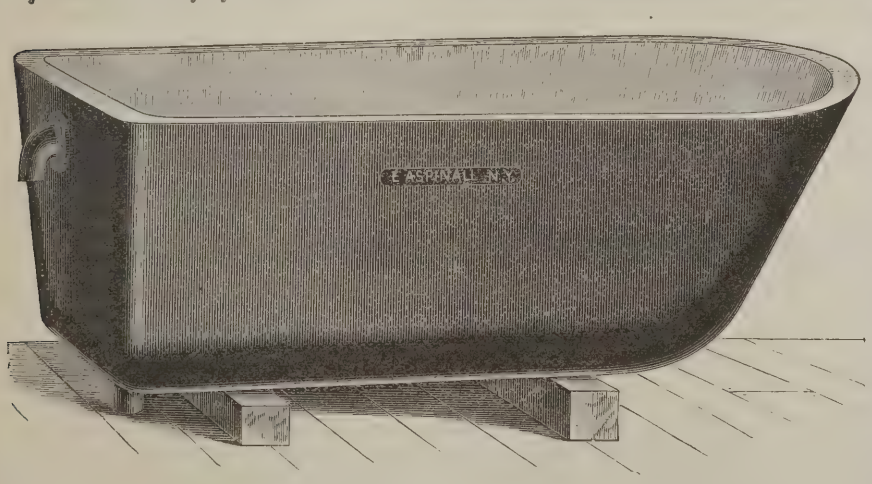


Fig. 2 —Crown Porcelain Bath.

Blind Nailing Machine.

Stranahan Bros., Minneapolis, Minn., are manufacturing the Stranahan Blind Nailing machine, which is represented in the accompanying illustration, Fig. 3. As its name indicates, it is used for raising the wood for blind nailing, and for this purpose has a bit or chisel which is operated by the lever shown in the cut. The instrument is placed on the wood and held in position by one hand, when by a pressure of the lever the bit is carried downward into contact with the wood, when by a continued movement of the lever it is forced the proper depth into the wood, and then carried along horizontally the requisite distance, so as to raise the grain sufficiently to permit the driving of the nail, and in such a form that it is not liable to break. The length of the instrument is about 4¼ inches, and the width of the chisel about ¼ inch. Under the handle in front of the instrument rubber is placed to keep it from slipping. Through the opening in the top the screw holding the bit or chisel in position can readily be reached, so as to permit its removal for sharpening, or its adjustment, so that it will cut deeper or shallower. A spiral spring under the lever forces it up when the pressure is withdrawn. The machine is neatly and well made, and nickel-plated. In alluding to it the manufacturers call attention to the facility and accuracy with which it works, and also give directions in regard to its use.

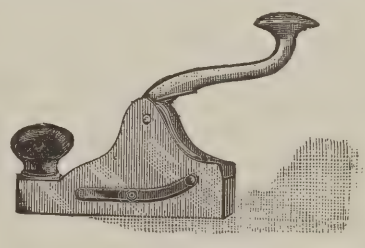


Fig. 3.—Stranahan Blind Nailing Machine.

Cunningham's Diagonal Band Saw.

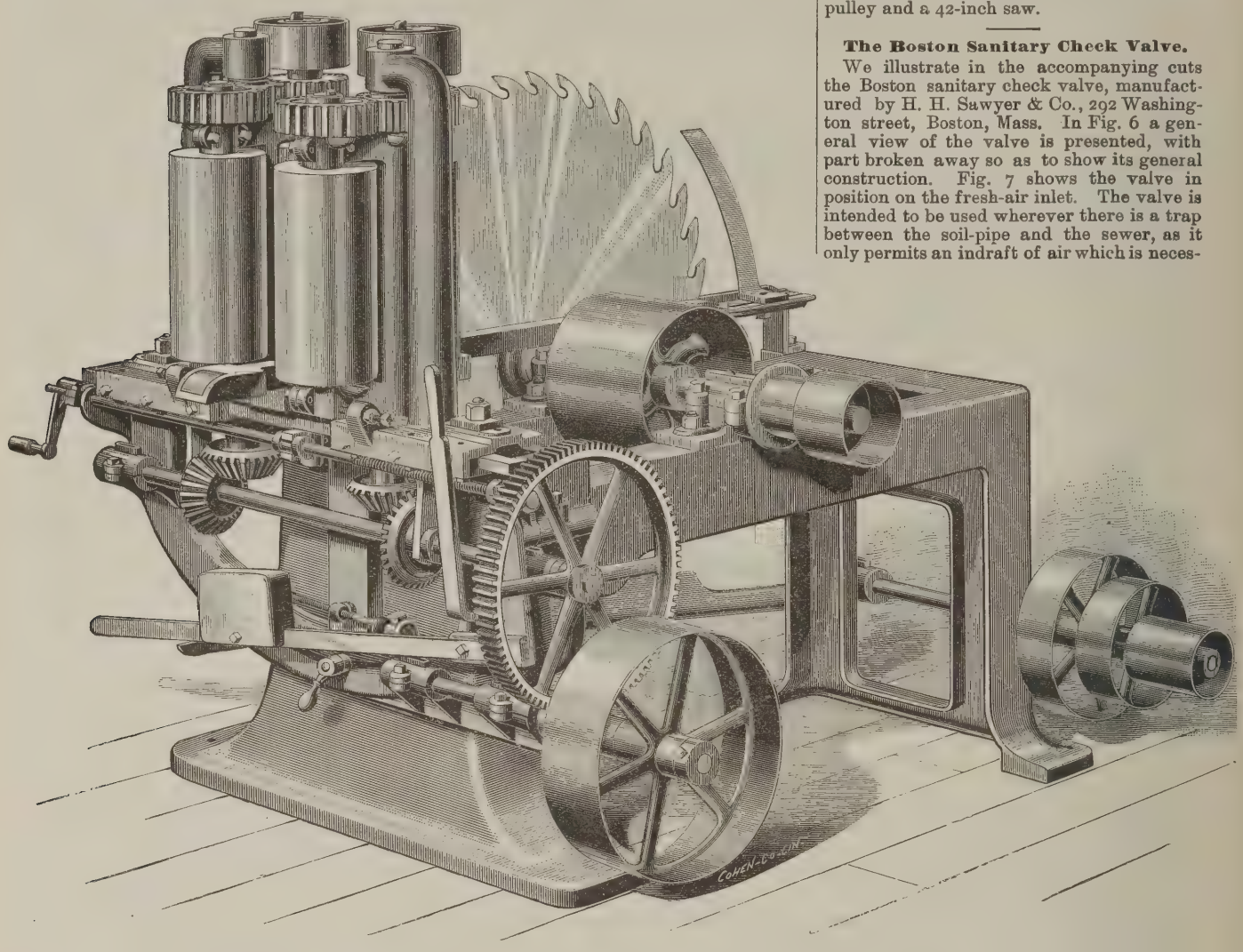
The Filer & Stowell Company, Limited, of Milwaukee, Wis., are manufacturing at their Cream City Iron Works, a new bandsaw mill, known as Cunningham's Diagonal Band Mill. They claim for this mill 50 per cent. additional capacity over the ordinary band mill. This is secured by setting the saw-frame at such an angle that the teeth enter the fiber of the wood in the same direction as the teeth of a circular saw. Ordinary band mills, with perpendicular saw-frames, cause the entire diameter of a log to be presented to the teeth at once, thus suddenly checking the saw and causing the overrunning of the upper wheel. This is avoided in the diagonal mill, which causes the teeth to enter the log gradually, commencing at the lower part. The manufacturers say that in their experiments they have found that timber fed at precisely the same pressure passed through just twice as fast when presented to the saw at the angle which they have adopted as when presented at right angles, but they do not claim that this ratio will be preserved on a large scale. The saw-frame is riveted to a heavy bedplate, to which the driving-shaft is also

for regulating the depth of cut when planing. The end of the arbor opposite that receiving the saw is fitted for holding boring bits, and a horizontal boring attachment is secured to the side of the frame having an

attached, with core-wheel and pinion, making the mill very compact and not liable to get out of order. The weight of the mill is 18,000 pounds. This company also build steam-feed engines for saw mills, and Cunningham's new double-cylinder reversing hoisting engine, adapted to use as warehouse hoists, builders' hoists, deck hoists for vessels, &c.

New Circular Resaw.

The Egan Company, 179 to 199 W. Front street, Cincinnati, Ohio, are putting on the market a new circular resaw, of which we present an engraving, Fig. 4. The saw is specially adapted for splitting either hard or soft wood in railroad car shops, box factories, planing mills, &c., and similar work. The frame sits very solidly on a broad base. The feed consists of four heavily geared rolls with an improved form of gearing, and the frame which carries the four feed rolls angles on the main frame in such a manner that all four rolls can be adjusted by simply loosening one hand lock nut. The setting and angling is done by an adjusting screw, enabling the operator to adjust the rolls accurately to any bevel. The rolls are self-centering—that is, a board 1 inch thick may be followed by another 1¼ inches thick, and both boards split in the center; or one pair of rolls can be made rigid by loosening one hand-nut so as to make one side of both boards ½ inch or more. The rolls come within ½ inch of the bed-plate, enabling the splitting of 1 inch strips if necessary. This is a great advantage. The Mandrel is of crucible steel and runs in self-oiling boxes, and with its boxes can be adjusted so as to accommodate any size of saw, and always keep it within the radius of the rolls so as to prevent any dodging, and compensate for wear on the saw. The machine is furnished with a taper-ground saw of the most improved make. It is made in two sizes; one has a 12 x 8 inch pulley and is furnished with a 36-inch saw, while the other has a 14 x 8½ inch pulley and a 42-inch saw.



Novelties.—Fig. 4.—New Circular Resaw, Built by The Egan Company, Cincinnati, Ohio.

Carpenters' Gauge.

The Springfield Machine Screw Company, Springfield, Mass., are about putting on the market a new carpenters' gauge, which is represented in the accompanying illustration, Fig. 5. This tool is 9½ inches in length, and consists of a steel bar, on one end of which is a steel roll for marking, with a spur for the same purpose on the opposite end. The head has a slotted sleeve, controlled by a clamping nut, by which it is fastened at any desired point on the bar. The spur is adjustable and removable, being regulated by the screw in the end of the bar, as shown in the cut. The illustration represents the gauge as arranged for use with the roll for marking, but if it is desired to use the spur the head can readily be reversed as indicated. The manufacturers call attention to the merit of this gauge, and put it on the market as meeting the demand for a good article of this kind.

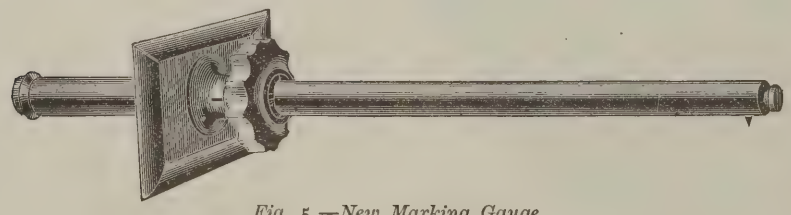


Fig. 5.—New Marking Gauge.

The Boston Sanitary Check Valve.

We illustrate in the accompanying cuts the Boston sanitary check valve, manufactured by H. H. Sawyer & Co., 292 Washington street, Boston, Mass. In Fig. 6 a general view of the valve is presented, with part broken away so as to show its general construction. Fig. 7 shows the valve in position on the fresh-air inlet. The valve is intended to be used wherever there is a trap between the soil-pipe and the sewer, as it only permits an indraft of air which is necessary to the ventilation of the soil-pipe. Where the fresh-air inlet is left open at the top, without check of any kind, a puff of foul air is necessarily expelled every time the soil-pipe is flushed. The reason of this is very simple, for the body of water descending the soil-pipe drives the air ahead of it, and, as it cannot pass into the sewer, it issues out of the fresh-air inlet. The location of this pipe is very apt to be close by a window, and, as a natural result, the sewer gas finds its way into the house. To check these outpuffs of foul air, and at the

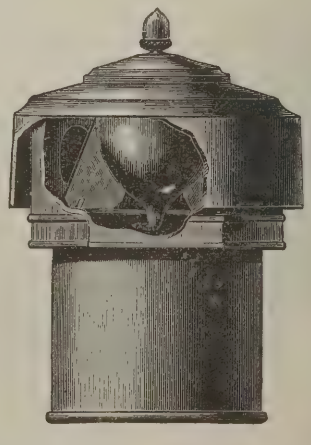
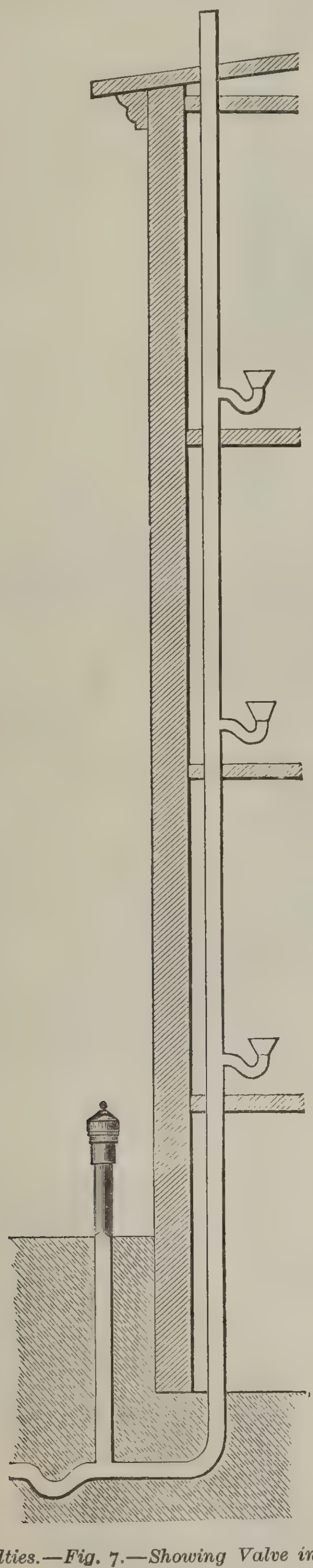


Fig. 6.—The Boston Sanitary Check Valve. —General View.

same time not interfere with the proper ventilation of the soil-pipe, were the objects the manufacturers of this valve had in view. The Boston sanitary check valve is made in three sizes, 2, 3 and 4 inch. The shaft or collar of the trap (see Fig. 6) enlarges into a five-sided cap, in three sides of which there are openings. The whole is covered with a second cap, held down at the center



Novelties.—Fig. 7.—Showing Valve in Position on Fresh-Air Inlet.

by a thumb-screw, so that the only air communication is through the three holes mentioned. At the inner sides of these openings shutters of thin sheet brass, hinged at the bottom, are so placed that a slight puff of air outward will throw them against the openings and prevent the air escaping. As soon as equilibrium is restored the shutters fall in against a centerpiece, so that the free entrance of the air is not interfered with. The body of the valve is made of cast iron, while the shutters and fastening screws are of brass. The device has not been very long on the market, but we are told that already a number have been used in New York and Massachusetts, and in all cases have given the most satisfactory results. Fig. 7 shows the application of the valve in connection with a soil pipe, open at the top and provided with a running trap between the house and sewer.

Steel Screw Nails.

A novelty in the way of a screw that will admit of driving is announced by the Russell & Erwin Mfg. Company, of New Britain, Conn., and general offices Chambers street, New York City. The special features of this article will be gained by inspecting Fig. 8 of the engravings. The name "screw nail" describes the characteristics of the new device in a marked manner. The diamond point permits of driving, while the thread gives the article the nature of a screw. It is made of wire, and in some of its features resembles the wire nail that is now coming into such general use. The screw can be easily driven with a hammer its entire length in the most thoroughly seasoned oak, maple, hickory or other hard wood. In ordinary practice, however, the sc ew is driven only part way and is then turned in with a screw-driver. The special features of these screws to which the makers direct particular attention are the pyramidal point, which cuts its way into the wood when revolved, the ratchet thread and the convex head. The peculiar shape of the point and the nature of the thread greatly facilitates the penetration of the wood without breaking down its fiber when driven by a hammer. The thread is also of the best shape to engage with the wood while resisting a pulling strain, while the form of the head obviates the liability of its breaking or splitting. In all cases the screws may be withdrawn with a screw-driver whether they have been hammered or screwed into the wood. We might refer to still other features that would be of interest to our readers, but inasmuch as the makers inform us that they were prepared to send a small box of samples of assorted sizes free and postage paid to every wood-worker who may apply for the same, we feel that further description is rendered unnecessary. Wood workers generally will be very apt to procure these samples and decide upon the desirability of the article for use by actual test. As we write we have a specimen box of samples before us. It contains some forty screws and nearly as many different sizes and kinds. As already mentioned, the articles resemble wire nails and screws combined, so that a pertinent description would be a cross between a wire nail and a screw. Some very carefully conducted tests have been made of these goods by Mr. T. S. Bishop, a well-known civil engineer, which are calculated to show the pulling resistance in different kinds of wood and the excess of strength of this article over the regular gimlet-pointed screw. As being of interest we give below the tabulated statement prepared by Mr. Bishop. The result in every case is the average of 10 screws of each kind and size, driven into the wood with a screw-driver in the usual manner without boring. These tests were made with a machine specially devised for the purpose. In applying the strain the weight was started at the same point for all screws of one size, and al-

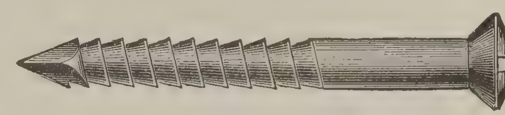


Fig. 8.—Steel Screw Nail.

lowed to remain 30 seconds on each consecutive 25-pound notch of the scale beam until failure occurred, any friction of the last half minute being noted and the necessary correction made in every instance.

Kind of screw.		Depth in wood. Inches.	Initial Strain. Pounds.		Ultimate pulling resistance. Pounds.		Excess of Diamond Point over regular Gimlet Point Screws.				
			White Pine.	Hickory.	White Pine.	Hickory.	White Pine. Pounds.	White Pine. Per cent.	Hickory. Pounds.	Hickory. Per cent.	Average per cent.
¾ inch, No. 4	Diamond Point...	⅝	80	288	103	414	12	13.2	[illegible]	14.	13.6
	Gimlet Point.....	⅝	80	288	91	363	......	......	......	......	......
¾ inch, No. 6	Diamond Point...	9-16	80	400	165	594	36	27.9	108	22.2	25.05
	Gimlet Point.....	9-16	80	400	129	486	......	......	......	......	......
1 inch, No. 8	Diamond Point...	¾	109	600	250	864	36	16.8	111	14.7	15.75
	Gimlet Point.....	¾	109	600	214	[illegible]	......	......	......	......	......
1¼ inch, No. 8	Diamond Point...	1	188	800	332	1,143	34	11.4	194	20.4	15.9
	Gimlet Point.....	1	188	800	298	949	......	......	......	......	......
1½ inch, No. 10	Diamond Point...	1¼	300	1,000	425	1,694	38	9.8	429	33.9	21.85
	Gimlet Point.....	1¼	300	1,000	387	1,265	......	......	......	......	......
2 inch, No. 12	Diamond Point...	1½	400	1,700	685	2,307	125	22 3	323	16.3	19.3
	Gimlet Point.....	1½	400	1,700	560	1,984	......	......	......	......	......
2½ inch, No. 12	Diamond Point...	1 15-16	500	2,250	923	2,708	69	8.1	224	9.	8.55
	Gimlet Point.....	1 15-16	500	2,250	854	2,484	......	......	......	......	......
3 inch, No. 14	Diamond Point...	2¼	1,000	....	1,205	......	119	11.	......	......	......
	Gimlet Point	2¼	1,000	......	1,086	......	......	......	......	......	......
3½ inch, No. 16	Diamond Point...	2½	1,300	.....	1,716	......	182	11.9	......	......	......
	Gimlet Point.....	2½	1,300	......	1,534	......	......	......	......	......	......

Emery Tool Grinder.

The Crystal Emery-Wheel Company, North Hampton, Mass., are introducing an Emery Tool Grinder that is of interest to

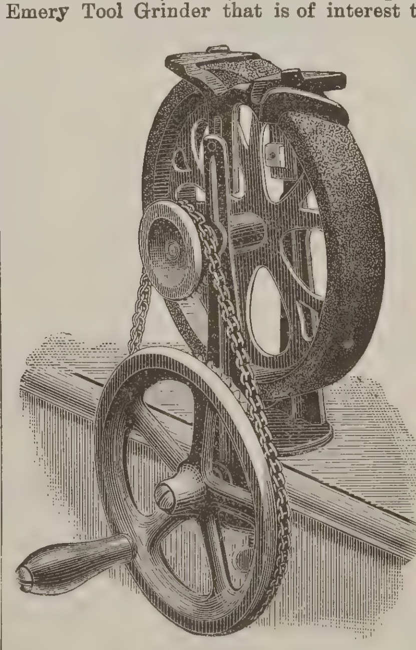


Fig. 9.—Emery Wheel Tool Grinder.

mechanics in general. Fig. 9 of the engravings shows the device. The emery-wheel has a cast-iron center, the rim being solid emery. The extreme diameter is 6½ inches, and the width across the face is 1

inch. The emery is of a character to be used either wet or dry. The emery-wheel is driven by means of a crank connected with the driving-wheel, and from which extends a chain working over sprockets to a similar pulley on the main axle. A tool rest is also furnished, which is convenient in holding the tools against the wheel. Several different forms of this article are manufactured, including one that is not geared, intended specially for household use. Machines are supplied packed in neat wooden boxes with sliding covers. An attachment at the bottom is provided for putting in place on a bench or on the edge of a table.

Garden City Engine-House Hinge.

The Chicago Spring Butt Company, Chicago, Ill., are manufacturing this article, which is represented in Fig. 10 of the illustrations. It was patented June 23, 1885, and has but recently been put on the market, some experiments having meantime been made, in order to make it of the most desirable pattern, with requisite strength,

Novelties.—Fig. 10.—Garden City Fire Engine-House Spring Hinge.

power of spring, &c. As the result of this inquiry and experiment, the spring is put on the market in the form represented, and is especially designed for the purpose o throwing engine-house doors open. Tw sizes are made, large for front doors,

New Band Sawing Machine.

Frank H. Clement, 131 Mill street, Rochester, N. Y., has added to his extensive line of wood-working machinery a new band-saw, Fig. 11, which embodies several new features that have been suggested by practical ex-

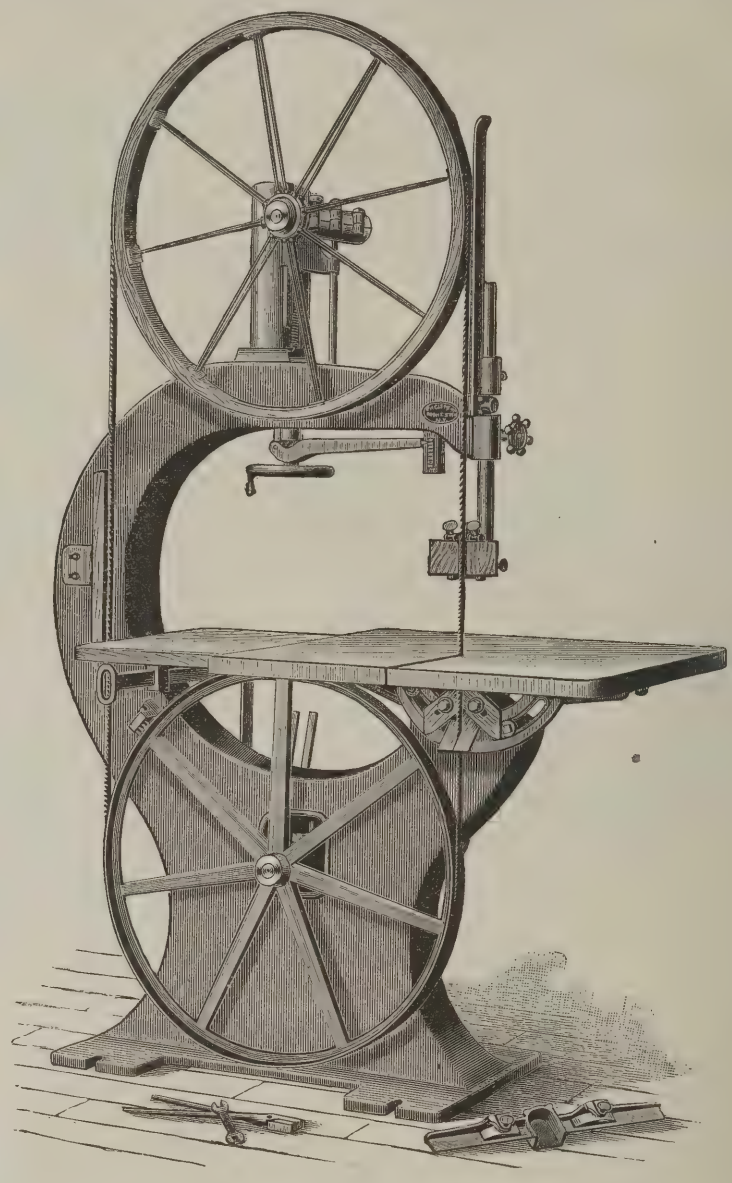


Fig. 11.—Improved Band Saw Machine.

perience with this class of tools. It is claimed for this machine that it is specially desirable in shops in which a great variety of work is done, and where there is frequent changing from narrow to wide blades. In all such cases it is essential to have the upper wheel very light and nicely balanced. On the other hand, the lower wheel will give better results when it is reasonably heavy. Accordingly, in the present machine, the upper wheel is built with steel arms, set bracing, and the rim is made from

ing table is similarly managed. Adjusting guides are provided on which may be used wood, either endwise or with the grain, or a metal face may be employed. Sway or vibration guides are provided between the wheels and the main guides. Self oiling loose pulleys are also included. The maker informs us that for every class of work which can be done on a band-saw this machine is equal to the best.

Parmlee's Patent Reversible Screw Driver.

W. L. Parmlee, Birmingham, Conn., is making the screw driver represented in Fig. 12. It has a malleable iron handle of the form shown in the cut, in which is a double blade reversible screw-driver

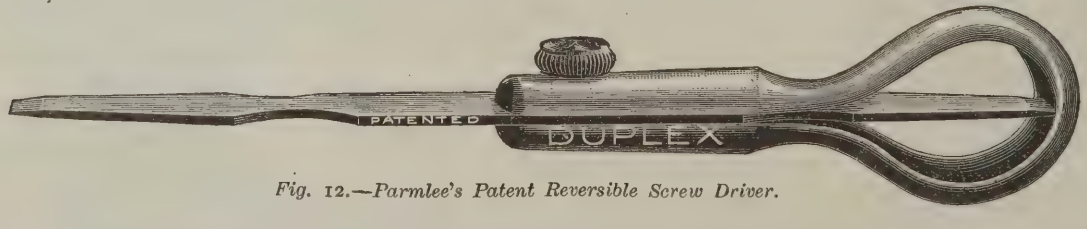


Fig. 12.—Parmlee's Patent Reversible Screw Driver.

inches long, and weighing 15 pounds to the pair, and a smaller size for stall doors, half the size of the above. The hinge is made very substantially, and with a powerful spring, and is intended for use in any case in which it is desired to have doors open quickly and held open. Its merits are attested by the Chicago Fire Department. The hinges are applied on the surface in every case, not being mortised.

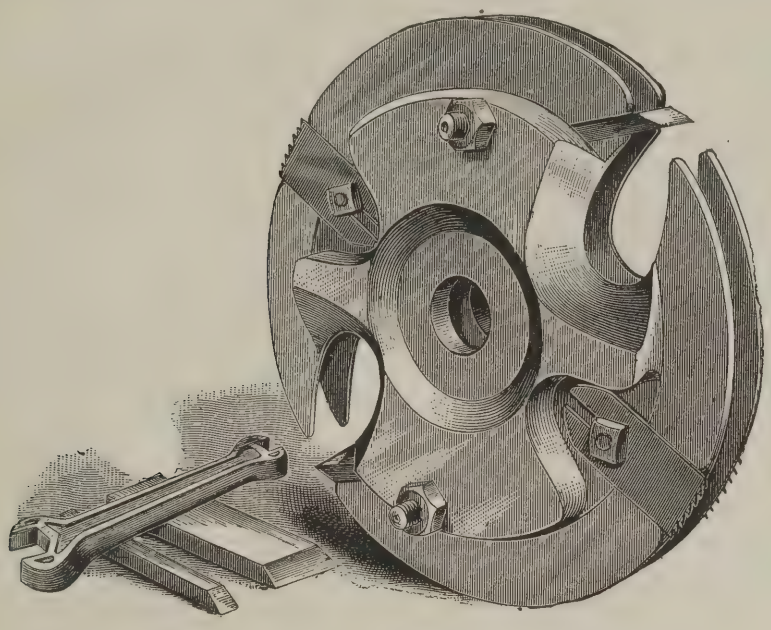
the best dried white pine glued up in thin segments and screwed through and through at the joints. By this construction the smallest possible weight is obtained with the greatest possible strength. All the arrangements about the machine have been calculated for convenience and durability. For example, the tilting of the upper wheel is done by a positive motion screw within reach of the operator at his post. The tilt-

bit, either end of which can be used as desired. In attaching this blade to the handle it is given sufficient play, so that the end not in use fits into the hollow of the handle, so that the screw being tightened it is held securely in place. The manufacturer calls attention to the lightness and strength of the handle and blade and the convenience with which the blade is reversed, and alludes to the leverage of the handle at

right angles to the blade as a desirable feature. It is described as made of the best cast steel and warranted. It is manufactured in three sizes, 4, 6 and 9 inch, which are finished with japanned handle and tinned bit with nickel blade and handle.

Adjustable Grooving Head.

An adjustable dado or grooving head that is being put upon the market by P. Pryibil, Fortieth street and Tenth avenue, New York, is shown in Fig. 13 of the engravings. The head consists of two composition flanges provided with adjustable scoring knives, which are so constructed as to be required to be removed only to compensate for wear. The flanges are also provided with adjustable and interchangeable routing knives of any desirable width from $\frac{5}{16}$ to 1½ inches, corresponding to the widths of the grooves to be cut. These can be easily and quickly changed. When the heads are set for a $\frac{5}{16}$-inch groove they take up 1⅛ inches room on the arbor. For wider grooves they take up as much more room as the groove is wider than $\frac{5}{16}$ inch. The work done with these heads is stated by the manufacturer to be equal in quantity and quality to that done by heads of common construction, while the advantages over the common article gained by this use are obvious.



Novelties.—Fig. 13.—Pryibil's Adjustable Dado or Grooving Head.

Ellrich Saw Set.

The Ellrich Hardware Company, of Plantsville, Conn., have just ready for the market the saw-set illustrated in Fig. 14 of the engravings. The cut is nearly full size, with the exception of the length of the handles. The tool is very simple in its parts. The set is driven forward by the leverage of the upper handle, while the position of the saw is controlled by a gauge, consisting of a piece of sheet brass bent over the front of the tool and controlled by the set-screw shown at the left. This brass gauge is adjusted up or down, according to the length of the saw teeth and the distance the operator desires to set them from the point. The set or plunger can also be regulated by means of the thumb-nut on its outer edge, immediately below the hung-joint of the upper handle. This nut acts as a stop, making it impossible to apply more pressure to the saw teeth than is necessary to set them, and, inasmuch as it can be placed at any point desired, it is a very simple matter to regulate the tool so as to set the saw uniformly throughout.

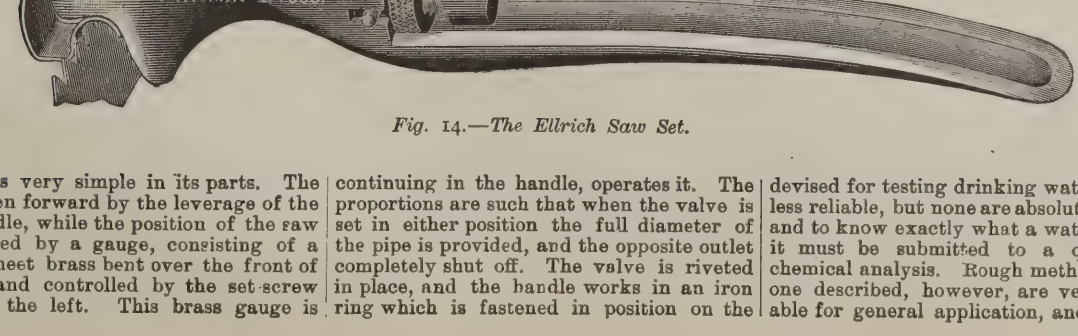


Fig. 14.—The Ellrich Saw Set.

Rain-Water Cut-Off.

Frank Van Uxem & Co., of Richmond, Ind., are introducing to the trade a new rain-water cut-off, Fig. 15 of the engravings. The cut so nearly shows the features of the device that very slight description is necessary. The valve is formed a little more than half-round and is supported at the back by a strap, which, continuing in the handle, operates it. The proportions are such that when the valve is set in either position the full diameter of the pipe is provided, and the opposite outlet completely shut off. The valve is riveted in place, and the handle works in an iron ring which is fastened in position on the side of the cut-off, and is so arranged as to operate readily without bringing undue strain upon the sheet metal. The entrance-pipe extends into the cut-off far enough to allow the ears of the valve to pass behind it, and for the ears of the valve to come up under it which everway the valve may be tipped. Accordingly there is no danger of leakage. The body of the valve consists of two pieces of metal joined in such a way as to secure the greatest strength, and yet put the article in the most convenient shape for use. We understand that a general assortment of sizes is being manufactured, adapted to all ordinary requirements.

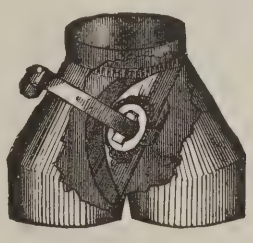


Fig. 15.—Rain Water Cut-Off.

Self-Heating Bath Tubs.

The Day Mfg. Company, of Detroit, Mich., are putting upon the market Day's Self-Heating Bath Tubs, an idea of which will be conveyed to our readers by a brief description. The tub in its general features is not unlike the ordinary bath tubs which are used in dwellings, with the exception that it is set upon legs so as to permit gasoline burners to come underneath it. At one end of the bath tub an elevated tank containing the supply of fluid is placed, and heat is thus applied to the bath tub in the same general manner as in the case of a gasoline cooking apparatus. A very complete line of these goods has been prepared, including different sizes of tubs for domestic use, and an entire outfit for barber shops and hotels. The company supplies a circular with illustrations to all applicants.

Testing Drinking Water.

A method recommended for testing drinking water is to add from 8 to 15 drops of a solution of nitrate of silver to a glassful of the water under examination, the silver solution containing 1 grain of the salt to ½ ounce of distilled water. If a heavy precipitate results from this addition the water is unfit for drinking purposes, and, speaking generally, the degree of impurity is proportional to the amount of precipitate thrown down. If the precipitate is light, of white color, evenly distributed throughout the water, and falls rapidly to the bottom, the water is good. If the water is colored gray, and the surface uneven, with a flocky or thread-like appearance, the water is bad. A blue discoloration of the water points to the presence of decomposing vegetable matter; brown flocks over a white precipitate show vegetable matter in an undecomposed state, and a black precipitate indicates the presence of the products of decomposed animal matter. A violet appearance without any previous blue discoloration occurs in pure water when a nitrate of silver solution is added, and the earlier the violet discoloration takes place the better is the water examined. When testing water by this method it is necessary to avoid strong sunlight, as the changes which take place in the nitrate of silver from exposure to bright light would be apt to vitiate the results. Many simple methods have been devised for testing drinking water, more or less reliable, but none are absolutely correct, and to know exactly what a water contains it must be submitted to a quantitative chemical analysis. Rough methods like the one described, however, are very serviceable for general application, and we think

if all of our readers tested their drinking water with nitrate of silver, not a few wells and streams would be found unfit for use.

TRADE NOTES.

MESSRS. CHARLES A. STRELINGER & CO., 86 Woodward avenue, Detroit, Mich., address the trade in another part of this issue on the general subject of small tools and their facilities for supplying the same. They publish a letter from a customer who has been well pleased with the result of his orders intrusted to this house.

THE OMEGA STOVE AND GRATE COMPANY, 89 Euclid avenue, Cleveland, Ohio, offer the trade a 20-page illustrated catalogue containing full information and prices of Dr. J. G. Smith's fireplace furnaces. This apparatus is described as a double heater and perfect ventilator.

WE HAVE RECEIVED from Murphy & Co., No. 227 Broadway, New York, samples of panels treated with their transparent wood finish which they are offering to the trade as specimens, sending them free, postpaid, on request. The panels are some 4 x 6 inches in size, made of strips of different kinds of wood, neatly joined together and protected at each end by a nickel plated metal strip. On the back of each panel is a card describing the manner of finishing and the materials used. One of the panels shows a glassy surface, while the other has been rubbed down The panels are what every one who is interested in a good finish will be pleased to examine, and it is the intention of the firm to give them wide circulation. Every architect and builder should secure a sample. A neat pamphlet describing the company's productions and containing directions for using the same accompanies the samples.

TOWER & LYON, of 97 Chambers street, New York, are directing attention to a line of wood-bottom planes, which are just ready, manufactured under Chaplin's patent. Their metal planes are well known, and the present line of wood planes is brought out in answer to a well-defined demand.

THE COILED WIRE BELTING CO., 93 Cliff street, New York, call attention to the door springs which they are manufacturing, and which are very satisfactory in general use. A number of sizes are produced, ranging in capacity from those for screens up to the heaviest doors. The spring is in the nature of a long, tight coil of wire, and is of a character to be readily attached.

THE E. WALKER TOOL CO., Erie, Pa., are directing attention to Walker's Micrometer Marking Gauge, and other similar tools which they are manufacturing, an illustration of one of which appears in their card in another part of this issue.

THE STANDARD WOOD TURNING COMPANY, 194 Greene street, Jersey City, N. J., offer an elaborate catalogue of machine turned balusters, pedestals, newels and other goods in the same general line. The terms upon which this catalogue can be obtained are mentioned in their card.

MESSRS. S. E. SMITH & BRO., stair builders, No. 177 West Seventh street, St. Paul, Minn., direct the attention of architects and builders to their stair-building factory, which they describe as the finest and best equipped in the Northwest. They say that it is supplied with every modern convenience for the cheap and rapid production of first-class stairwork of the latest style.

WE ARE IN RECEIPT of the 1887 catalogue issued by the Duplex Steam Heating Company, No. 10 Barclay street, New York. This company manufacture steam-heating apparatus for private houses, banks, offices, churches, hotels and public buildings, under Fiske's patents. The catalogue is a pamphlet of 62 pages printed in two colors. It shows different forms of apparatus for different purposes, including radiators, radiator screens and the usual fittings. There is contained also in it a treatise on steam heating, and a special explanation of the advantages of the form of apparatus illustrated. The usual testimonials are appended near the close of the book.

KNISELY & MILLER, of 129 South Clinton street, Chicago, Ill., inform the trade that they are in the market with a very desirable article of corrugated conductor pipe. Their pipe, unlike many of its competitors, is free from cross seams—that is, the lengths as produced in the factory are of one solid piece of metal. The advantage of pipe with cross-joints only once in 8 feet will be very generally appreciated by architects and builders.

THE CAMBRIDGE ROOFING COMPANY, of Cambridge, Ohio, manufacturers of Crowl's patent roofing siding, inform us that their prospects for the coming season are very bright indeed. They state that orders are coming in rapidly, and that the demand for their special kinds of roofing is increasing. Their illustrated catalogues and price lists for the new season are ready, and the trade is invited to send for copies.

WE HAVE RECEIVED from the Holton Iron Roofing Company, of New Lisbon, Ohio, copies of their latest issue of circulars relating to Holton's iron roofing. From these publications we learn that over 8,000,000 feet of this roofing is now in use. Numerous testimonials are published relating to the satisfaction with which the roofing has been used by different customers

WE HAVE RECEIVED from Koelling, Klappenbach & Kenkel, 48 Dearborn street, Chicago, Ill., a copy of the blank building specifications which they publish. The specification is divided into several different heads, according to the trades represented. The copy before us is from the revised edition, and in the publisher's circular special attention is directed to the plumbing section. Accompanying the specification is a form of certificate and order on owner for payments in favor of the builder.

BULLARD & GORMLEY, manufacturers of builders' hardware, tools, &c., 106 Lake street, Chicago, Ill., have just ready for the market a new door lock, with a knob so constructed and fitted as to overcome the objection commonly raised to the ordinary article. The shank of the knob is inserted through the escutcheon, which is screwed to the door, and engages with the yoke moving the latch, by a two-armed cam. All the parts are arranged in a way to be positive in action, overcoming lost motion and avoiding all rattling and shaking. There are no spindle screws or washers.

A MAMMOTH HOTEL is projected for Philadelphia. It is to occupy the square bounded by Broad, Walnut, Sampson and Juniper streets; $750,000 toward the necessary copital have been subscribed. The drawings provide for a magnificent structure, with three front elevations, embracing nine stories and a mansard roof, and having a frontage of 235 feet on Broad street and a depth on Walnut of 180 feet. The hotel will contain 500 rooms *en suite*.

F. W. TEIFENBRUNN, No. 407 South Fourteenth street, St. Louis, Mo., has sent us a copy of his catalogue of plaster centers, brackets, capitals and corbels and plaster ornaments in general. The designs are varied, some of them being engravings and some *fac-similes* of photographs. The title of the book indicates the general character of its contents. The illustrations are supplemented by a price list.

WE HAVE RECEIVED from the Real Estate Exchange, of Baltimore, the first annual report of the president and directors. This covers the year ending December 31 last, and there is appended to the report a list of the officers, committees and members.

A VERY TALL BUILDING is about to be erected in Pittsburgh, on the corner of Penn avenue and Ninth street. It is designed entirely for offices, and will be fireproof in all its features. The building is projected by the Westinghouse Company, and Mr. A. Peebles, of Pittsburgh, is the architect. The building will be nine stories in hight, and will have a frontage of 80 feet on Penn avenue and 110 feet on Ninth street. A feature of the design is a corner tower, which will be some 200 feet in hight.

TWO LITTLE BOOKS have been issued by the Page Belting Company, of Concord, N. H., that are of interest to all users of machinery. One of these is the catalogue of the company, and has a very complete presentation of the general subject of belting, including the features of good belts, the claims of the company with respect to their own belts, a chapter on main driving belts, sections illustrating the sewing of belts, practical rules with reference to shafts and pulleys, and formula for calculating belts, pulleys, &c. The second book is entitled "Kinds and Grades of Belting Used for Different Kinds of Work." This contains much that every user of belts desires to know, and it is indexed in such a way as to be of the greatest usefulness. Both pamphlets are sent free to all applicants.

IN A RECENT ISSUE we referred to the destruction by fire of some of the shops of the Egan Company, Cincinnati. We learn that the ruins are being torn down, and that there will be erected on the site of the old building a modern four-story brick structure, the dimensions of which will be 150 x 40 feet. The offices of the company will be located in the new building, and the remainder will be used for manufacturing purposes in connection with the old shops.

A LETTER from Clarke W. Harrington, editor of the *West River News*, South Londonderry, Vt., informs us that there is plenty of material and labor in the vicinity of that town, with several water powers and shops almost idle. It is the desire of the citizens of the place to secure more business. The location is 36 miles from Brattleboro, on the Brattleboro and Whitehall branch of the Central Vermont Railroad. The shops are fitted up for woodwork of all kinds, and we are assured that there is no trouble with labor in the neighborhood named.

BARLOW BROS., Grand Rapids, Mich., a short time since sold out their paper box department in order to obtain more room, and to devote their attention more closely to the manufacture and sale of the Barlow patent manifold shipping blanks. The sale of this article, we understand, has been increasing very rapidly of late. In the future, users of these great labor savers will be supplied by the firm from an establishment of three floors, measuring 100 x 25 feet each.

THE CINCINNATI MOLDING COMPANY, of Cincinnati, Ohio, are considering plans for the erection of a four-story brick factory building, which will be located on Riddle street, between Bank and Harrison avenues. The building will be modern in all its details; and it is expected to be ready for occupancy by June 1.

ON THE FIRST of March the Globe Iron Roofing and Paint Company, of Cincinnati, announce a change in name, consisting in eliminating from the official title of the company the word "Paint," and substituting for it "Corrugating," thus forming a new name, "The Globe Iron Roofing and Corrugating Company." We understand that the object of the change is to rid the name of a misleading element and to cause it to more correctly agree with the nature of the company's business. The change in name does not involve changes in any other respect, and for the future the business of the company will be managed the same as it has been in the past.

THE GRAND RAPIDS PORTABLE HOUSE COMPANY, Grand Rapids, Mich., for whom Rönne & Barbour, New York, are agents, are offering the trade some very attractive portable cottages suitable for use in various places. They direct attention to their advantages over tents for fishing and camping-out parties, and for other similar purposes. The sides and roofs are of three-ply veneer, the fastenings are iron pins and the work is put together without nails or screws. The assertion is made that the houses can be put together and taken down without mutilation in a very short period of time.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE CONVENTION of the Builders of the United States at Chicago in the last week in March was a remarkable collection of able men. Their deliberations were marked by earnestness, carefulness and assiduous attention to the dispatch of business. There was no unnecessary waste of time in the consideration of any question, but the objects for which the convention had been called were considered with gravity, vigor and an intellectual breadth that would have been creditable to men engaged in professional pursuits. The builders of the country may be proud of the impression made by the first national convention of their craft. The builders of Chicago have likewise earned an enduring name among their associates from other cities for the hospitality of their reception. Nothing was spared to make this session of the association memorable to those whose privilege it was to test the good fellowship of the builders of Chicago.

THE intelligence that the New York Master Plumbers have agreed to recognize and support the trade schools of this city is welcome news. We have often pointed out how very inadequate are the existing provisions for instruction in the various trades. With no system of apprenticeship or any equivalent, the young beginners are generally left to pick up their trade as best they may. Such a slipshod method of acquiring a craft must have its after effects be a man ever so smart and energetic. As a fact, American workmen do not take their proper place as the best workmen in their own country. To give a single instance: On the Equitable Building now in process of construction, on Broadway, in this city, it is stated that out of nearly 400 carpenters employed not more than 50 are American born. This is not a solitary case, but one which may be found repeated all over the country on the best jobs. The workmen of this country should make up their minds not to be ousted in this manner, but they may be sure that as long as they retain the present system, or rather want of system, in the means for learning a trade, while other nations possess good apprentice systems and spend large sums of money for the purposes of technical education, that they stand a great chance of retaining their present position of second best. The plumbers have taken a step in the right direction, and, it is much to be hoped, that some of the other trades will follow suit.

PLUMBERS in England appear to have taken as important a step as their cousins have here. Recognizing the fact of the large number of incompetent men employed as plumbers and the consequent injury to the public health and to their trade in general, they have adopted a system of holding examinations, both in practical and theoretical knowledge, and the granting of certificates or diplomas to those who pass successfully. They hope, and with a considerable amount of reason, that the public, realizing the advantages which they must of necessity gain from such a system, will before long refuse to employ plumbers who are not qualified by diploma. Of course an easy step beyond is the making of a law limiting the practice of plumbing to holders of diplomas.

THE LATE national convention of builders at Chicago acted very sensibly in eliminating the word "master" from the title of the organization, which is an outgrowth of their deliberations. The association is to be known as the National Association of Builders of the United States of America. The proposed organization had been alluded to in preliminary proceedings as an association of master builders. The term was one which had evidently been used, just as many other expressions of doubtful taste are frequently employed, because most people are inclined to repeat what they hear without bestowing any thought upon the exact meaning of the words. From time immemorial local associations of persons engaged in the building trades have been in the habit of styling themselves master builders, master carpenters, master plumbers, master bricklayers, master plasterers, master painters, &c. Out of a list of 169 such associations located in various sections of the country, which list had been prepared for the use of the national convention, no less than 104 names contained the word "master," two substituted for it the more objectionable word "boss," while the remainder consisted of builders' exchanges and associations of such a character that the word "master" could not very well be used, which to some extent explains its non-appearance as part of their titles.

IT IS not many years since the word "ironmaster" was equally common in the iron trade. Every man who owned or had an interest in a blast furnace, rolling mill or forge, was called an ironmaster or alluded to himself as such. Organizations of manufacturers almost invariably adopted the word as part of their name. Reports of conferences between manufacturers and their workmen characterized the former as "master" and the latter as "their men." An official journal of a manufacturers' organization, published in Philadelphia as late as 1873, was known as the *Ironmasters' Gazette*. Now, however, except among the oldest members of the trade, with whom habit grew to be second nature, the term is obsolete in America. It is still used abroad, where the relations between employers and employees are very different from those existing in this country, and where changes of any kind occur much less rapidly than here. The elimination of this word from ordinary use in the American iron trade was not brought about by any sudden movement against it either on the part of workingmen or employers. It simply passed away in due course of time, because it was not in harmony with the progress of the age and the growing importance of workingmen engaged in mechanical pursuits as a great factor in the maintenance of our national institutions. The men employed about our ancient charcoal furnaces, whose interests in almost every particular were paternally regulated by a lordly proprietor, looked up to him as a master, but the independent workmen in modern ironworks regard themselves as abundantly able to take care of their own affairs, if indeed they may not often be charged with a disposition to manage those of their employers.

BUT AS a time came when iron manufacturers dropped the word "master," so does the time now seem to be at hand when it will be dropped by the building trades. Their national association has very properly taken the initiative, and its example will no doubt be followed by the local associations. This course was foreshadowed by the New York delegation to the convention, who introduced a resolution stating that the term "master" is one that indicates the condition of servant, and which time and circumstance have to a great extent caused to grate harshly upon the ears of sensitive people, and recommending that this term should be as far as possible eliminated from the titles and records of all societies and organizations hereafter having representation in the National Association of Builders. The reading of this resolution was received with marked approval, which was strongly indicative of an awakening of thought upon the subject.

ONE OF THE effects of the real estate boom now in progress in numerous Western cities is the following effusion by the *Globe*, of Atchison, Kansas: Tell me not in mournful numbers that the town is full of gloom, for the man's a crank who slumbers in these days of boom. Life is real, life is earnest, and the grave is not its goal, every dollar that thou turnest helps to make the old town roll. But enjoyment and not sorrow is our destined end or way; if you have no money, borrow—buy a corner lot each day! Lives of great men all remind us we can win immortal fame; let us leave the chumps behind us, and we'll get there just the same. In this world's broad field of battle, in the bivouac of life, let us make the dry bones rattle—buy a corner lot for wife! Let us then be up and doing, with a heart for any fate, still achieving, still pursuing, booming early, booming late.

THE very pleasing prospects in the building trade which were present early in the season are somewhat marred at the present time by the numerous strikes which again characterize the opening of the active season of the year. At this writing an extensive strike among the carpenters prevails in several different parts of the country; the plumbers' strike in New York is not yet declared off, although to all practical purposes it is ended, while other strikes among the plumbers are in progress in Connecticut, Ohio and other States. Brick masons, stone masons and other mechanics in the building

trades have also their troubles in different localities. It remains to be seen whether the general disaster to the season's business which occurred last year is to be repeated the present year. Should arbitration happily solve the difficulties, or should settlements be reached in any other way in which neither side is treated unjustly, there will yet be a good year's business; but if disputes in the building trade continue capital, which is always wary, will fail to go into buildings, and will be invested elsewhere, to the loss of those engaged in the building business. The cloud now not much larger than a man's hand may be the coming of only a spring shower. Happy indeed will builders be if it is not a more serious matter.

THE REPORT reaches us from St. Louis that the contracting builders propose holding in that city the coming fall a national convention, limited to men in their own class of trade. Arrangements for the meeting are said to be under way and making very satisfactory progress. It is intimated very plainly that the contracting builders regard the National Builders' Convention, held at Chicago a short time since, as entirely unsatisfactory to them. It is claimed that it degenerated from its original purpose into a mere convention of the amalgamated house building trades, and very much to the chagrin of the contractors, who found themselves in so much of a minority that they were powerless even to prevent or change the course of events which frustrated the prime objects which they desired to obtain. Accordingly, it is proposed to confine the deliberations of the St. Louis convention strictly to persons and firms who contract to put up buildings from the very foundation, furnishing the materials and necessary work for a given amount of money.

THE amount of absolute nonsense that gets into print concerning technical and scientific subjects is almost beyond comprehension. The latest instance that has come under our notice appeared in a Western paper and is entitled "The Science of Geometrical Drawing Simplified for the Use of Young Mechanics and Students in Architecture." The article, unfortunately, is only the first of a series, and if the errors in the future numbers continue in the same proportion as they have begun, "the young mechanic and student in architecture" will acquire a very uncertain kind of knowledge. To attempt to revise even the first chapter would trespass too much upon our space; we will therefore confine ourselves to a few of the most apparent misstatements. Three straight lines drawn at different angles to one another are given as illustrations of vertical or perpendicular lines. The definition given is as follows: "Any line rising above the level of a horizontal or right line may be classed as vertical or perpendicular." In the first place, vertical and perpendicular are not synonymous. A vertical line is one drawn at right angles to a horizontal one, while a perpendicular line is one at right angles to any line and may occupy any position in space, perpendicular being a relative term simply. Further on we learn that a "tangent is a straight, horizontal, perpendicular or right line touching a circle, but the point of contact must be parallel with the diameter." This definition limits tangents to circles, and would lead us to infer that a circle is the only curved line to which a tangent can be drawn. But the most extraordinary clause in this definition is that which states that the point of contact must be parallel to the diameter. To speak of a point being parallel to a line is preposterous, for how can a point which has neither length nor breadth hold any such relation to a line which has length? Many of the other definitions, if not so utterly absurd as the ones we have noted, are yet expressed so vaguely as to be misleading to say the least.

THE following description of the process of manufacturing, which is commonly known as sawdust ornaments, appears in a recent issue of the *Timber Trades Journal*: "A mold, or die, which has the design to be produced artistically engraved and sunk in it, is covered with thin strips of chemically prepared veneer of any desired kind of wood, and a material previously prepared, consisting chiefly of sawdust, is fed on the top of the veneer; the mold is then closed and heated, and afterward subjected to an hydraulic pressure of some tons to the square inch. The article to be produced is then taken from the mold in a semi-shaped state, inspected, recovered with veneer as often as may be found necessary, and after five or six minutes a panel, or frieze, is produced equaling in artistic effect handwork that has taken very many days to produce. These panels have a fine surface, and show up the grain of the wood well; they can also be sawn, planed or bored like ordinary wood."

THE reputation of straw lumber has gone abroad in the world. Among the items in one of our English exchanges, with reference to the forthcoming American Exhibition in London, we encounter the following: "We are promised, among other novelties, a house of straw, which is now being made in Philadelphia. This house is to represent an American suburban villa, announced to be 'handsome and artistic in design,' two and a half stories high, and covering a space of 42 feet x 50 feet. It is constructed entirely of materials manufactured from straw—foundations, timbers, flooring, sheathing, roofing, everything in fact, including the chimneys—the material being fire-proof as well as water proof. The inside finish is to be in imitation rosewood, mahogany, walnut, maple, ash, ebony and other fine woods, the straw lumber taking perfectly the surface and color of any desired wood. This straw house is, in the first place, to illustrate Philadelphia's commercial, financial and industrial interests by means of large photographs of the leading buildings; but it will also demonstrate how far the inventive Yankee has succeeded, not in showing us how to make bricks without straw, but how to produce timber from straw. If, after this brilliant exhibition of inventive genius, we do not bow down and worship him as the 'licker' of creation, we may consider ourselves lost to all sense of what is proper under the circumstances."

THE PLATES.

In Plates XVII, XVIII and XIX of this number are shown elevations, plans and longitudinal section of a combined brick and frame house, designed by J. L. Wees, of St. Louis, Mo. The drawings speak for themselves, leaving very little to be added in the way of description. Details of different features of construction are shown in some of the text pages.

In Plate XIX are shown two studies in parquetry flooring, by R. Fischinger, New York. On the bottom of Plate XIX are shown two ornamental designs for wall anchors. At the bottom of Plate XX is a design for mosaic tile work for a vestibule, by the same designer. In Plate XX are shown additional designs for overmantels, being a continuation of the serial article that has been running in our columns for some months past.

Overmantels.

In plate XX as noted above will be found three additional designs of overmantels. By reference to the engravings it will be noticed that the overmantel shown in Fig. 1 is of a more expensive character than anything that has preceded it. Flats, or plain spaces, are introduced around each of the mirrors, which give a pleasing and good effect to the job. Cornice moldings are added instead of "facings" butting between pilasters; an extra shelf is indicated in middle part, and fretwork underneath the shelves. The pediments are enriched with carved panels, not merely with incising and moldings. All these additions make a job look pretty, but of course take a considerable amount of time to work out, and consequently are more costly. For this design the backings should be got out of inch stuff. The outside ones should be 2-inch wide, which will allow 1⅛ inch for pilasters, ⅝ inch for flat between pilasters and moldings, and ¼ inch to lip on corner. The inside backings should be 3⅜ inch wide, which allows 1⅛ inch for pilaster, ⅝ inch for flat round center plate, and ½ inch for molding. The moldings will form the rabbets. The bottom bar, or backing, should be 2 inches wide at sides, and 2¼ inches in middle division. The additional ¼ inch might be added after the frame is put together. The horizontal rail immediately above the center plate should be 3⅜ inches wide, which leaves ⅞ inch for shelf, ⅞ inch for top and bottom flats, ½ inch for under molding to lip on, and ¼ inch for top one. The top backing should be 3¾ inches wide; it would work out to the following sizes: ½ inch for molding, 1⅝ inches for frieze, and 2 inches for cornice moldings. The cross rails for sides may now be cut out; they should be 2½ inches wide. In this instance ⅝ inch is allowed for shelf, ⅝ inch for flat under and above shelf, and ¼ inch for molding to lip on. The top side backings should be 3¼ inches wide, which works out as follows: 1½ inches for cornice, 1½ inches for frieze and ¼ inch for molding to lip on to. The vertical rail in middle of top division should be 1⅜ inches wide. Next put the backings together. They should be mortised and tenoned or doweled. In common work they are only half lapped. Clean off and veneer the front, then clean up the veneer. Next strike the pilasters and fix. After the pilasters are glued on, cut off the part of the deal backing that projects beyond the pilasters above the side cornice molding; then veneer the sides and clean up the pilasters. The moldings might now be struck for openings, cleaned up and fixed. The shelves, pillars, brackets and pediments should next be got out, as before described. The curved semicircular shelves at top should be turned in one piece and afterward divided into two equal parts. The frets underneath shelves should be got out of ¼-inch stuff and prepared for the fret cutter. Then strike cornice moldings either out of the solid or in sections. The easiest way to work the moldings would be in sections, as follows: First work the hollow out of a piece of ½-inch stuff; cut the dentil molding out of stuff ¼ inch thick, then strike the ovolo molding at top, and miter each molding separately. When this is done the job should be ready to be fitted up.

In our next illustration (Fig. 5) only one semicircular turned shelf is shown in middle of top part instead of two, as drawn in Fig. 1. The designs of pediments, side brackets, turnings and shaped work underneath shelves differ from those given in our preceding sketch. The enrichments might either be fretted or carved. As will be seen, two small beveled glass mirrors are shown underneath the bottom side shelf. The dimensions of our present illustration are intended to be made the same as those for Fig. 1, and the job should be made in a similar manner. Either of the accompanying designs would, we think, prove useful to manufacturers.

Portable Houses.

Our illustrations on this page are selected from a catalogue recently issued by the Grand Rapids Portable House Company, for which Ronne & Barbour, No. 31 New street, New York, are agents. They represent features of construction in which our readers will feel an interest, and, considered as an article of merchandise, the houses are of a character to be of more than passing interest to a large number in every community. Where buildings are wanted for temporary purposes in connection with camp meetings, fishing excursions, or at seaside resorts, for hunting trips and for numerous other purposes that might be mentioned, it is many times to the interest of the carpenter to be able to advise where to buy, or to buy and sell the article himself, rather than to attempt to invent and construct. In the portable houses here referred to certain features of construction are employed, which render them light, portable and at the same time strong. The general appearance of a cottage is shown in Fig. 1. Of this particular design the company manufacture several sizes, among others, 8 x 10, 10 x 12, 12 x 14 and 12 x 17 feet. The hight from floor to eaves ranges from 7½ to 8 feet, and the cottage is supplied with or without the veranda on end, as may be desired. Many other designs are also supplied. Fig. 3, of the illustrations shows a skeleton of a building, and indicates how it would be put up. Supposing, of course, that the building is wanted only for temporary purposes, the foundations are made of stakes driven into the ground. The little diagram at the left of the figure marked A shows how these foundation stakes may be cut from pieces of boards. The stakes are cut from 1 x 6 inch lumber, and are about 20 inches long. The stakes are driven to within 6 inches of the ground at the highest corner, and the sills are laid in place to locate the other corners, after which the stakes are driven level with the first, and then intermediate stakes, at intervals of about 30 inches, are put in place. The stakes are placed crosswise of the sills, so as to give a good bearing. The sills are put in place as indicated, after which the main floor is laid. Corner posts are then put up and the plates D are put in position. The panels, one of which is shown in place in the cut, are slipped in place in grooves cut in the studs. Panel No. 1 is inserted in the corner post, and then the short girt, No. 2, is put in place, after which the short panel, No. 3, is inserted, fitting in a groove in the short girt and also in a groove in the plate. Stud No. 4 is then put in position. The work is arranged to go together without nails and screws. Pins, dowels, studs, &c., are provided and the construction is such as to secure great strength wherever needed. Other panels are inserted in the same way, and in the case of windows and doors they are put in place upon the same general plan. The roof also consists of panels. Fig. 4 shows a section of a panel and indicates its composition. It is, in fact, about $\frac{3}{16}$ inch in thickness, and consists of three sections of wood glued together, the grain of the middle section running opposite to the grain of the other two. Fig. 2 of our illustrations shows a cross section through a hunter's cabin, and indicates an arrangement of bunks that is possible in such a structure. In the spaces indicated by A near the floor are lockers for blankets, the lids of which serve for the lower bunk and for seats when the upper bunk is thrown up, as indicated on the right. The company direct particular attention to the comforts and conveniences afforded by hunters' cabins constructed upon this plan as compared with tents. The cabin is lighted by a transom over the door, and may be securely locked during the day or during the absence of the occupants. The company draw particular attention to the light weight of the buildings which they produce, and the consequent low cost of transportation. The assertion is made that houses made after the construction we indicate weigh from 500 to 2000 pounds, including cases, dependent upon the size of the building. It is claimed that an insoluble cement is used in making the panels, and the company do not hesitate to guarantee their durability in any climate. The houses are painted in attractive colors both inside and outside, including floors, and are carefully packed for shipment. In the catalogue before us, in addition to what we have enumerated, are shown bathhouses, both single and grouped, folding tables, folding chairs and tourists' cots, for use in connection with these buildings. The catalogue is one that will interest architects and builders wherever situated.

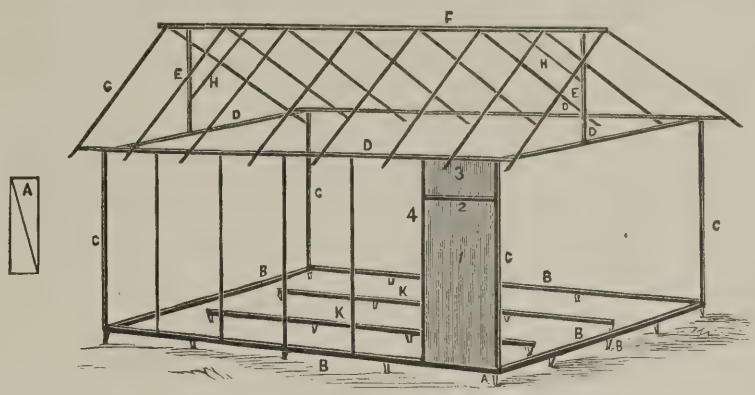
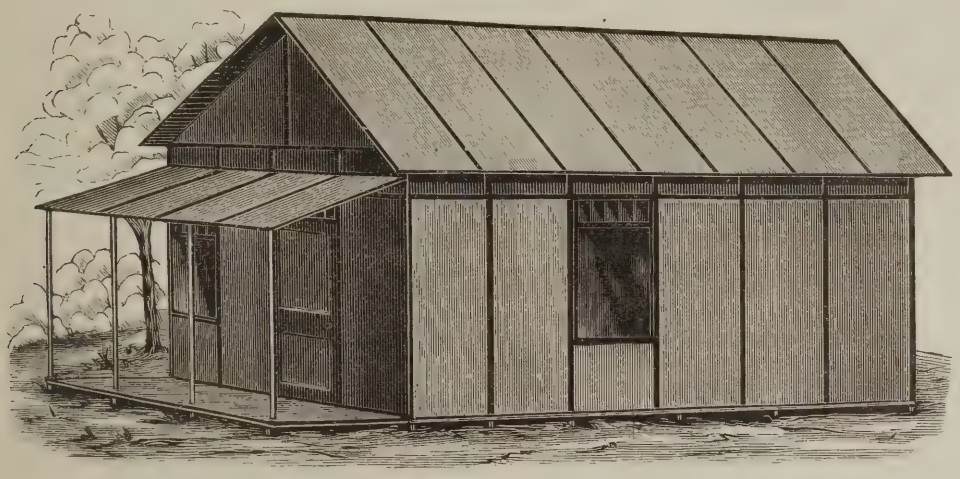


Fig 3.—Diagram Illustrating Method of Setting Up.



Portable Houses.—Fig. 1.—Cottage Supplied by the Grand Rapids Portable House Co.

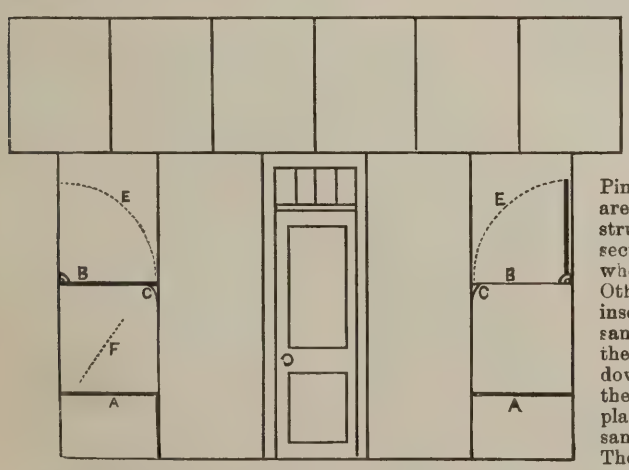


Fig. 2.—Cross-Section Through Hunter's Cabin, Showing Arrangement of Bunks.

Fire-Proof Buildings.

A correspondent of one of our exchanges, writing over the *nom de plume* of "Builder," presents the following remarks with reference to fire proof building construction, having particular reference to the means which may be employed to render wooden buildings of slow combustion. What he has to say is of interest to many of our readers:

Once in a decade a building that is supposed to be fire-proof is put up in the city, and great is the noise that people make over the event. It is not every one who can afford to make a building out of railroad iron and cast iron; yet, if people would only stop to think a little, they could have their building almost fire-proof, or so they

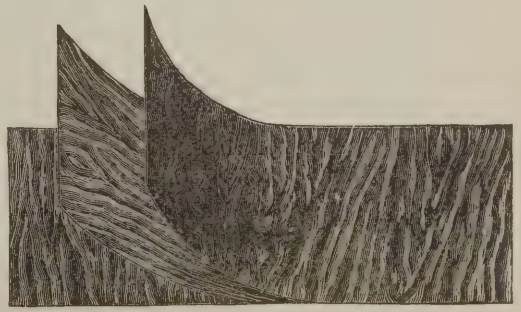
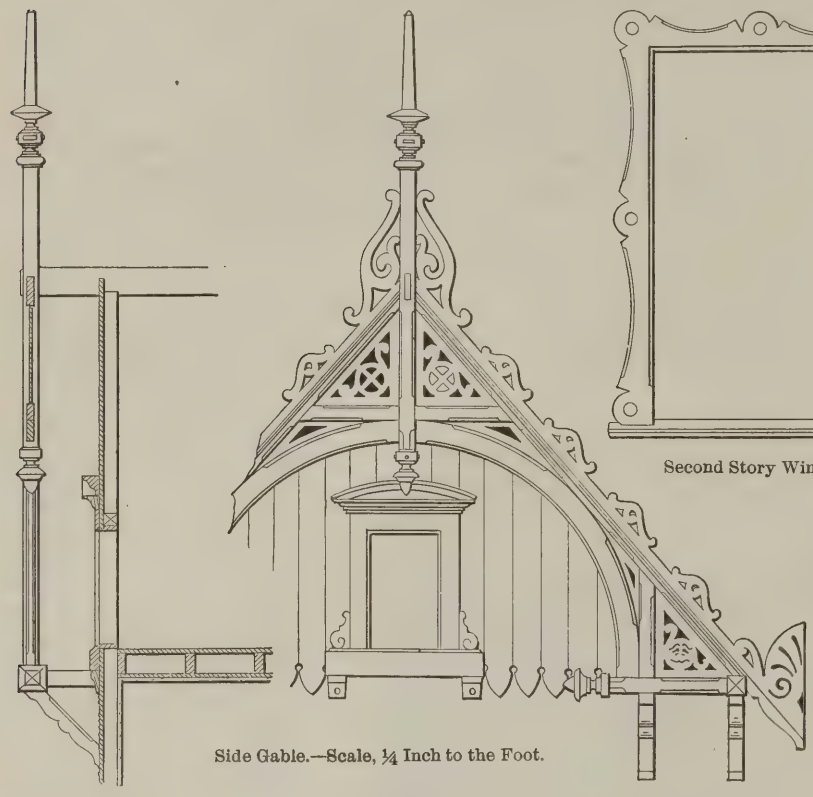


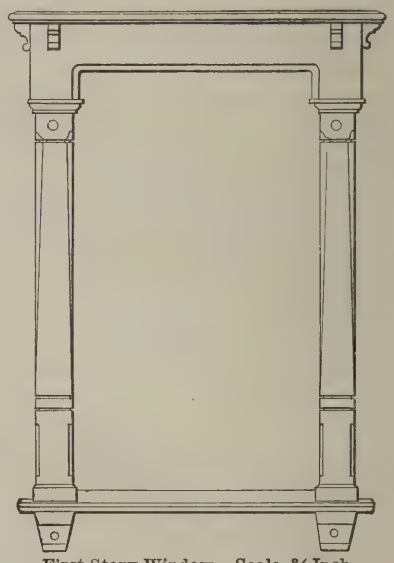
Fig. 4.—Section of Panel, Showing Method of Gluing Together.

would not burn down, which is about the same thing. All of the lath, studding, joists and under side of floor boards could receive a good coat of whitewash; this would render them almost fire-proof—at least so that it would be hard for a fire to start, and, if it could not get started, then how could it burn? Sometimes there are pieces of studding placed between the studs for braces. If these braces were only made so they would not burn, burn much, if any. The roof boards should be well soaked in whitewash, then strips of lath could be nailed on every 4 inches, and the spaces filled with mortar. When the shingles should be put on, there would be no fire that could get through. During the hot days of summer, the air under a roof becomes almost as hot as fire, and as this great heat turns the rosin that is in the boards into gas, which mixes with the air, a compound is formed that is just like fire, evaporation keeps the woodwork moist, and in case of a fire, would be of great service. Most every one expects there will be fires, but for some reason thinks their place will be exempt. This is very poor protection, Once I was putting up some iron shutters on a building, and there were four that the owner wanted to be so arranged that they would stay open except in case of fire. Then he wanted them to close at once. He informed me that he did not think any one

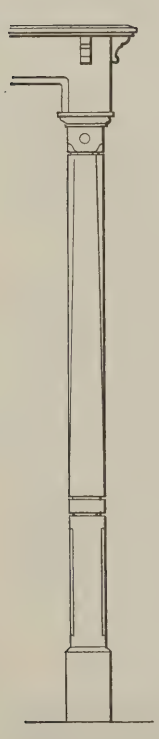


Side Gable.—Scale, ¼ Inch to the Foot.

Second Story Window.

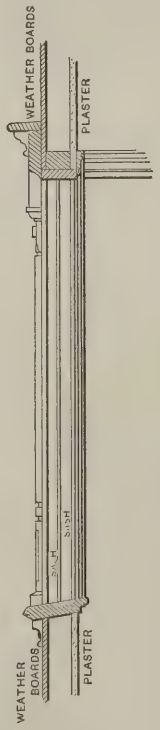


First Story Window.—Scale, ⅜ Inch to the Foot.

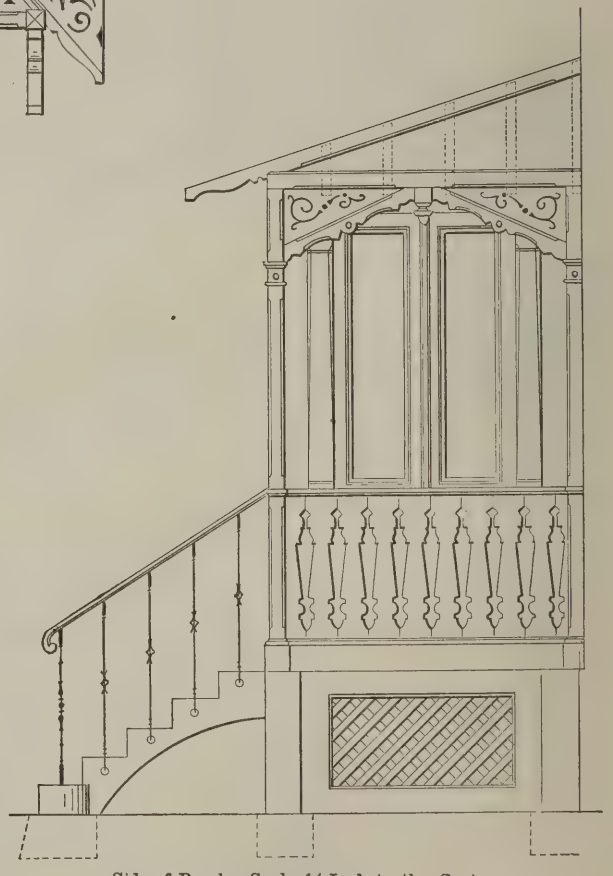


Front Door.

Scale, ⅜ Inch to the Foot.



Section Through Window.



Side of Porch.—Scale, ¼ Inch to the Foot.

House Building in Trinidad.—Details of Design by G. Gerald. For Elevations and Plans, See April Number.

the fire could not get from one story to another, and a building could not "burst into flame" a few moments after the fire was discovered. If the sides of a wooden building were to be made so that in case of a fire they would not burn, all that would be required would be to lath and plaster the building on the outside before the siding was put on, then no ordinary fire could get through, and into the building; if it did, the joist being covered with lime would not only it is not burning. But let the least spark in the world get to this gas and how soon a fire will be over the whole house! Let the reader blow out a burning kerosene lamp, and then apply a burning match near the wick, and note how soon the gas catches fire. These are the conditions that exist under a roof, but if all of the wood is only made fire-proof, how difficult it would be for the wood to burn!

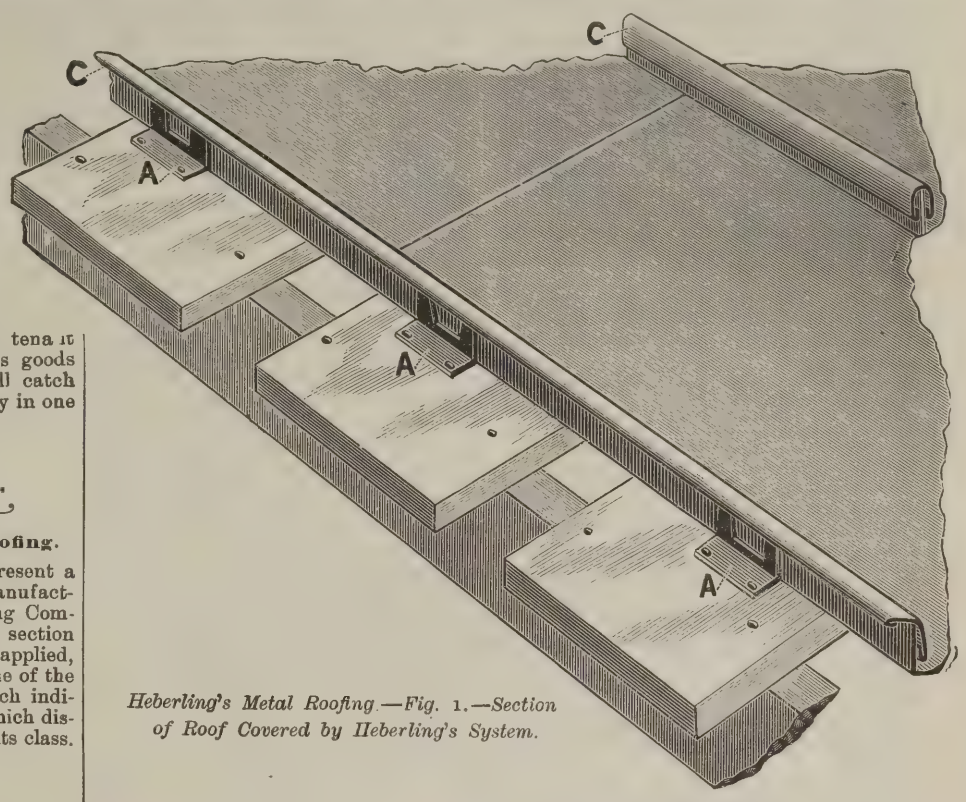
If a tank of water is kept in the attic, the could do that. It was as easy as anything, if one only knew how. The shutters were hinged at the top, then lifted up and tied with a piece of tarred string. As soon as any fire would be near enough to do any damage, it would be sure to burn off the string, then down would fall the shutters, and the fastening was so arranged that it would hold, so the fire was supposed to close the shutters. Some such arrangement could be made in buildings, so the fire would

be its own destroyer, and not wait until the fire had to eat its way through the side of a house to let people know it was there. It would be hardly polite to pass those good fire protectors called deadeners by without a notice. These pieces of board, which are placed between the floor and ceiling and covered with mortar, are good to keep the fire from above, and if they were only well soaked in whitewash or lime-water they would make it almost impossible for the fire to go either way. It is hardly to be supposed that a wooden building can be made as fire-proof as a brick one, yet the wooden one can be made so it will be harder to burn than a brick one, as usually made. About all that a fire-proof building amounts to is, that it will not burn up. That fact is supposed to please the owner. But it does not make much difference to the tenant what becomes of the building if his goods get on fire once, and his goods will catch on fire from inside causes as easily in one kind of a building as in another.

ROOFING NOTES.

Heberling's Sheet Metal Roofing.

The illustrations on this page represent a new form of Sheet Iron Roofing, manufactured by the Heberling Metal Roofing Company, Havana, Ill. Fig. 1 shows a section of roof to which the covering is applied, while Fig. 3 shows a side view of one of the caps with the cleats attached, which indicates the feature of construction which distinguishes this roof from others of its class.



Heberling's Metal Roofing.—Fig. 1.—Section of Roof Covered by Heberling's System.

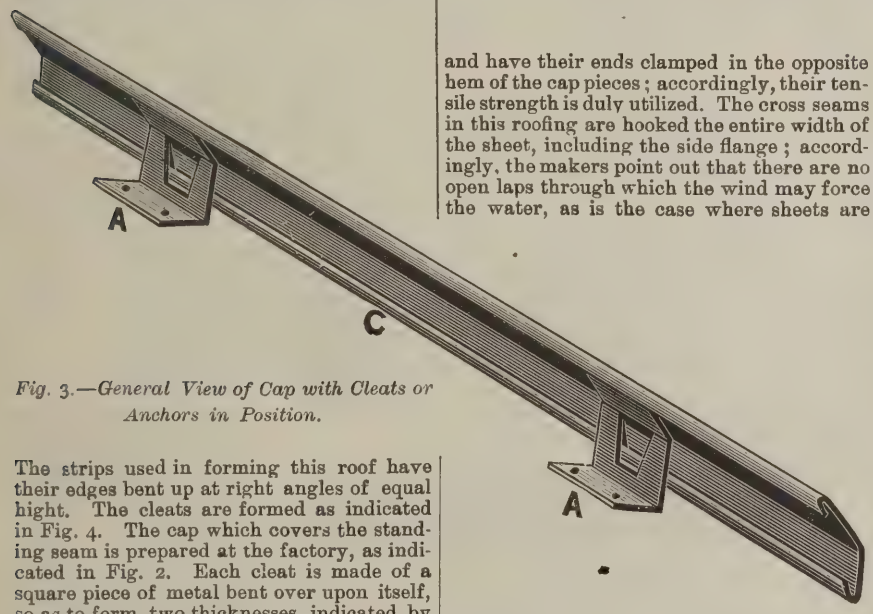


Fig. 3.—General View of Cap with Cleats or Anchors in Position.

The strips used in forming this roof have their edges bent up at right angles of equal hight. The cleats are formed as indicated in Fig. 4. The cap which covers the standing seam is prepared at the factory, as indicated in Fig. 2. Each cleat is made of a square piece of metal bent over upon itself, so as to form two thicknesses, indicated by A in Fig. 4. The nails, accordingly, have two thicknesses of metal instead of one, as is the case ordinarily. The cleat is slitted upon the folded edge, so that one part of it is bent down, as indicated at the back of the cut in Fig. 4, while the other extends outward. The capping indicated at C, in Fig. 2, slips on to the cleat, as indicated in section in Fig. 5, and also by general view, as shown in Fig. 3. The cleat shown in Fig. 3 differs somewhat from the cleat already described, but embodies the same features, and may be regarded as indicating alternative construction. Samples of both kinds are sent us by the company. The cleats are slipped into the cap, as indicated at Fig. 3, and then, in laying the roof, cap and cleat together are set down over the upturned edge of the sheet, as indicated by A A A in Fig. 1. The adjacent or abutting sheet is then put in position in the usual way, covering over the nailing flange of the cleat, after which the cap is bent down in the form indicated in the seam at the right in Fig. 1. Among the advantages enumerated by the makers and set forth in their circular we note the following: This covering has no holes or fastenings through its sheets or exposed surfaces. The construction is such as to secure an equal and strong adjustment to the roof boards, and at the same time it adequately provides for expansion and contraction. Both sides of adjoining sheets are fastened alike. The cleats or anchors fall directly over every flange, and have their ends clamped in the opposite hem of the cap pieces; accordingly, their tensile strength is duly utilized. The cross seams in this roofing are hooked the entire width of the sheet, including the side flange; accordingly, the makers point out that there are no open laps through which the wind may force the water, as is the case where sheets are improperly joined at the ends. The makers also direct attention to the construction as being easy on the material and leaving the roof sound when finished. There is no crimping or capping formed on the sides of the sheets with the ridges, running with the grain of the iron, to crack in closing the seams. The caps are formed from strips cut crosswise of the sheets and have the grain running across their ridges, and are therefore tough and free from the danger of cracking in working. The makers also point out that this roof requires no special sheeting. It is supplied in rolls, the edges being turned up on the roof in the process of laying. The cleats or anchors are movable in the caps, and are readily adjustable to the requirements of the sheeting. The caps have both edges hemmed, and may be quickly shoved, one over the other, making a continuous line from comb to eave along the seam to be covered by them. Accordingly, they are handled rapidly. When the cleats or anchors, with the connected caps attached, are placed for nailing, the capping stands in position ready, without change, to receive the next row of sheets. When these are laid, a slight forward turn of the capping, the ridge of which is partially formed at the factory, renders it ready to be rapidly and perfectly finished by a single application of the seaming tongs. We understand that this form of roofing is furnished by the makers in common sheet iron, sheet steel, or in tin plate.

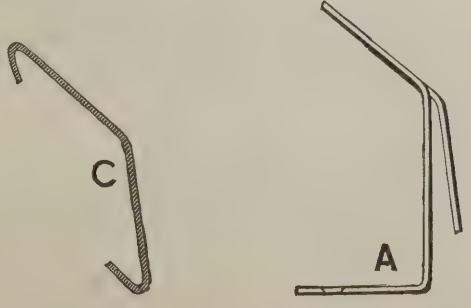


Fig. 2.—Section through Cap.

Fig. 4.—Cross Section through Cleat or Anchor.

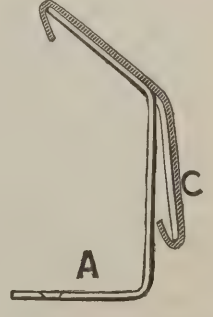


Fig. 5.—Cross Section through Cleat or Anchor with Cap in Place.

Iron Roofing Manufacturers' Association.

The following resolutions were unanimously adopted at the second meeting of the Iron Roofing Manufacturers' Association held in convention March 22 and 23:

Resolved, That standing seam and crimped edge, roofing, siding and ceiling be sold by the square; and that corrugated roofing, siding and ceiling be sold either by the square or by the pound, as preferred.

Resolved, The rules of measurement in selling standing seam iron roofing shall be as follows: When shipped as sheets, the full length of sheets shall be measured with end locks turned or considered as turned; when shipped in rolls, with the sheets locked together, the running length of the rolls shall be measured together with the actual covering width of the sheets or rolls.

Resolved, The rule of measurement for V or crimped edge roofing shall be as follows: The full length of sheets shall be measured, without any allowance for end locks or laps, together with the actual covering width.

Resolved, The rule of measurement in selling corrugated roofing, siding or ceiling, and beaded iron siding and ceiling shall be the full measurement after being corrugated or beaded, no allowance being made for either side or end laps.

Resolved, That for standing seam and (V) crimped edge painted roofing the following shall be the gauges and corresponding weights:

Standard roofing gauge, weight not less than 75 pounds to the square.
Standard No. 26 gauge, weight not less than 83 pounds to the square.
Standard No. 24 gauge, weight not less than 103 pounds to the square.

Resolved, That for corrugated painted iron roofing, siding and ceiling the following shall be the gauges and corresponding weights:

Standard roofing gauge, weight not less than 75 pounds to the square.
Standard No. 26 gauge, weight not less than 83 pounds to the square.
Standard No. 24 gauge, weight not less than 103 pounds to the square.
Standard No. 22 gauge, weight not less than 127 pounds to the square.
Standard No. 20 gauge, weight not less than 156 pounds to the square.

The following supplementary resolutions were adopted at the afternoon session of the same day:

Resolved, That all quotations be made on a basis of cash 30 days, with note or acceptance for extension of time, adding interest.

Resolved, That in no case shall nails, paints, paper felting, wood strips or tools be furnished free with roofing, but shall be charged for as additional items in the bill of roofing.

Resolved, That wherever steel sheets are so used the price charged shall always be proportionally in advance of the cost of iron roofing; also

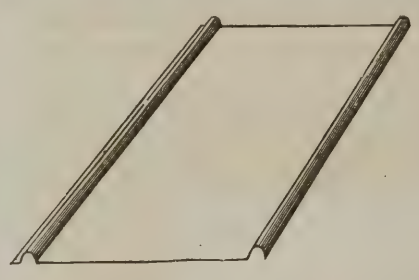
Resolved, That all the rules and regulations heretofore adopted regarding the sale, measurement, weight, &c., of iron roofing, apply also to steel roofing.

Resolved, That corrugated iron of less than two inch corrugation, and all irons corrugated crosswise of sheets, be sold at not less than five per cent advance over price of regular corrugated.

Resolved, That the foregoing resolutions of this convention be understood to take effect April 1, 1887.

The Bodine Roof.

The Bodine Roofing Company, of Mansfield, Ohio, are directing the attention of the trade to recent improvements which have been made in their style of roofing. This roofing, as many of our readers already know, consists of a prepared wood-pulp board laid upon the roof in flat sheets, and securely nailed at the edges. The board is a special preparation upon the part of the manufacturers of material of this kind, while it is subjected to a special treatment at the hands of the roofing company. The roof has been before the public for some five years past, and in that interval has attracted a great deal of attention. It is serviceable both on flat and steep roofs, and has been approved, in many instances, by insurance experts. The improvement, which has been recently introduced, is clearly indicated in Fig. 1 of the engravings. A rib or half bead is formed on each side of each of the boards used in laying the roof. This bead is perhaps ⅝ or ¾ inch in diameter. On one side of the sheet it is made slightly smaller than on the other, thus enabling the abutting beads to fit over into each other. An edge is extended outwardly from one of the beads which lies down on the surface of the sheet that is overlapped, as clearly shown in Fig. 2 of the engravings. Fig. 3 shows nearly full size one of the joints made in this way. At the eaves or near fire-walls and against chimneys, where it is necessary to stop up a space formed by two



The Bodine Roof.—Fig. 1.—General View of a Roofing Sheet as at Present Prepared.

beads, a wooden core is used of the kind shown in Fig. 4. This core, however, is not run through the seam its entire length. The overlapping sheets are fastened by nails driven through the bead, as shown in Fig. 3, and sustained by a tin cap. How the cross-seams are made is also indicated in the same figure. We have recently examined samples of this roofing, and in answer to objections that will naturally be raised by roofers concerning the strength of the longitudinal seams formed in this manner, we would say that the strength of the board is sufficient to bear a man's weight when he steps upon these raised seams. In other words, the strength of the longitudinal seam in this roofing is largely in excess of the usual standing seams in metal roofing. A circular relating to the manner of putting on this roof has been recently issued by the company. Narrow inch lumber, dry surfaced and laid close, is specified for the sheeting. Nothing over 6 inches wide, it is said, should

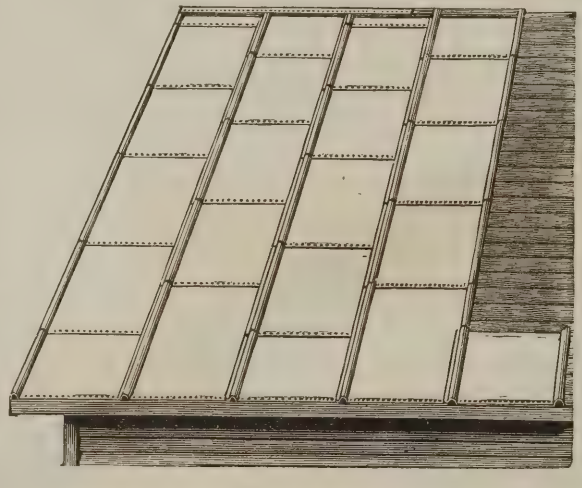


Fig. 2.—General Appearance of the New Bodine Roof When in Place.

be used. Matched sheeting is recommended. The company have recently perfected angle pieces for flashings, valley caps for combs and hips and other trimmings, all made out of this same material. In laying this roof the joints are laid in paint, and barbed wire nails are used, with tin caps. A thorough coat of paint is applied to the roof when finished.

Items.

Mr. Edward E. Scribner, of the well-known firm Scribner-Libbey Company, of St. Paul, Minn., was elected second vice-president of the National Builders' Association at the meeting held in Chicago, March 29. Mr. Scribner has long been identified with local organizations in St. Paul, and is in hearty sympathy with the national movement.

A device for repairing shingled roofs has been patented by Arthur Ricketson, of New Bedford, Mass. The invention consists in a suitably sized sheet of metal, provided with projections or spurs on one or both sides, formed by cutting through the metal shingle on two sides of a triangular space and bending the cut portion to a right angle with the surface for the purpose of holding the shingle in place. The device is applied by forcing the upper end of the metal shingle under the wooden shingles and over the leaky spot, and then pressing it down, which forces the spurs formed as above explained into the surface of the roof.

The Union Station, at Indianapolis, Ind., requires altogether about 1500 squares of tin roofing. The specification calls for N. & G. Taylor's Old Style plate. This firm, writing us regarding this work, say that it will employ some 500 boxes of 20 x 28 plate.

Carpenter, Annear & Co., of Louisville, Ky., send us a copy of their circular, dated March, 1887, which, in addition to an enumeration of the general lines of work in which they are engaged, contains illustrations of some of the prominent buildings upon which their work has been placed. These include courthouses at Terre Haute, Frankfort and Salem, Ind., and also the Union Railway Station, at Indianapolis, Ind.

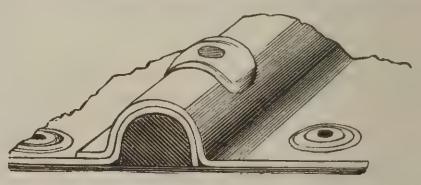


Fig. 3.—Section of a Longitudinal Seam.

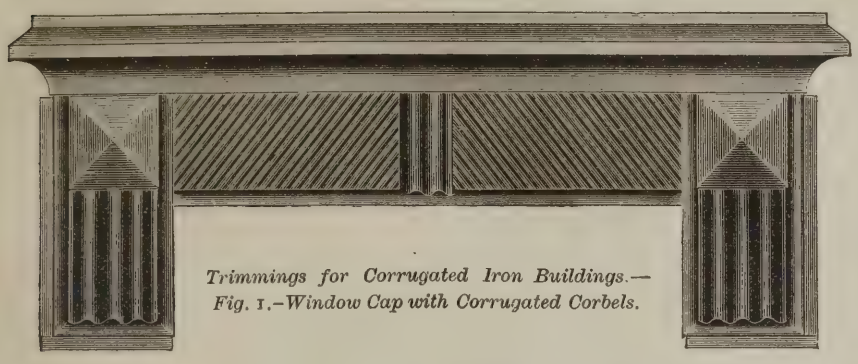
The last two buildings are included in this circular in view of contracts which have already been made. The work, of course, has not yet been performed.

In reply to an inquiry concerning the present condition of the slate trade, with which they are prominently identified, Messrs. Auld & Conger, of Cleveland, Ohio, state that the outlook for business at the present time is unusually good. They say especially is this the case with sea-green slate, with which their firm is especially identified. Orders have been so brisk that they have, for some time past, been unable to ship as promptly as desired. Other manufacturers and dealers, we learn, are also in the same condition. It has been asserted that the lively demand for slate the past few weeks has been caused in some measure by the expected increase in freight rates growing out of the Interstate Commerce law. Inasmuch as the rates on slate are not materially advanced, it would seem that the demand had been very largely influenced by the prospective business of the season. Messrs. Auld & Conger inform us that the visible supply of slate, both in Vermont and Pennsylvania, is very limited. The demand has been sufficient to consume about all that was left over last fall. With good weather, the stocks will soon be replenished, and then orders can be shipped promptly. Prices are stated to be fair and steady, and, unless the business should meet with some unforeseen disaster, there is not likely to be any change for the year.

Fig. 4.—Core Piece

The eleventh edition of the catalogue of the Cincinnati Corrugating Company, bearing date of the present year, of which some 15,000 copies were issued, is one of the neatest works, typographically speaking, that has come to our notice. It is printed on good paper, with red-line borders, and is tastefully arranged in all its

features. The first page is devoted to a very fine view of the works of the company, located at the corner of Eggleston avenue and Culvert street. Several new illustrations appear in the pages of this pamphlet,



Trimmings for Corrugated Iron Buildings.—Fig. 1.—Window Cap with Corrugated Corbels.

including the flouring mill of Cowen & Co., Memphis, Tenn., which is covered on all sides with corrugated iron. An awning of the same material is thrown out, and the deck roof is covered with the standing seam-roofing made by this company.

A TRADE CIRCULAR of the Porter Iron Roofing Company, Cincinnati, Ohio, bearing date for the present year, is printed in two colors of ink on pink paper, bound in a mottled blue paper cover. The pamphlet contains illustrations of straight and curved corrugations, standing-seam roofs, finish at ridges, and also illustrations of the roll and cap roofing which this company manufacture.

N. S. REED, General Agent of the Richland Mutual Insurance Company, writing to the Bodine Roofing Company, of Mansfield, with reference to a fire that occurred at Kent, Ohio, some time since, contains a statement that is of interest to our readers in general. We quote: "A building just west of one covered with your roofing in a business block was burned, making a very strong fire and covering your roof with sparks, cinders and burning brands. There was another building covered with a tin roof just north of the one covered with Bodine roofing. Sparks, cinders and burning brands fell on the tin roof, the same as on yours, but it was necessary after the fire to repair and repaint the tin roof, whereas in the case of the Bodine roofing, it was entirely uninjured and no damage whatever was claimed by the owner, notwithstanding the fact that burning brands fell on to it in considerable quantities and continued to burn until they were entirely consumed."

THE CANTON IRON ROOFING COMPANY, of Canton, Ohio, send us a copy of their pamphlet relating to iron roofing, siding and ceiling, from which we learn that the business was commenced in 1877. The pamphlet is attractive in appearance, and, among other features, contains a map of Ohio, giving the location of the city in which this company is located and of its railroad facilities. The pamphlet is one that will interest every architect and builder.

MR. JOHN GALT, of John Galt & Son, 25 John street, New York, informs us that the condition of the slate trade at the present time throughout the different slate manufacturing sections is very favorable indeed. It is probably in better shape than at any period before in 10 years' time. The stocks at present are very light, owing in some measure to the large shipments which were made early in the spring in anticipation of increase in freight rates growing out of the Interstate Commerce bill. The operation of the bill, he informs us, so far would seem to be favorable to the slate interest. Rates from Pennsylvania are, under the new arrangement, 2 cents per 100 pounds less than formerly, which is equivalent to about 13 cents per square. Rates from Vermont remain unchanged.

Trimmings for Corrugated-Iron Buildings.

With the extensive use of corrugated iron for roofs, siding, &c., there arises a demand for trimmings of a character to correspond with the material. Almost every roofing concern has given more or less attention to this question, and if all the specialties which have been devised were gathered together a very extensive assortment would

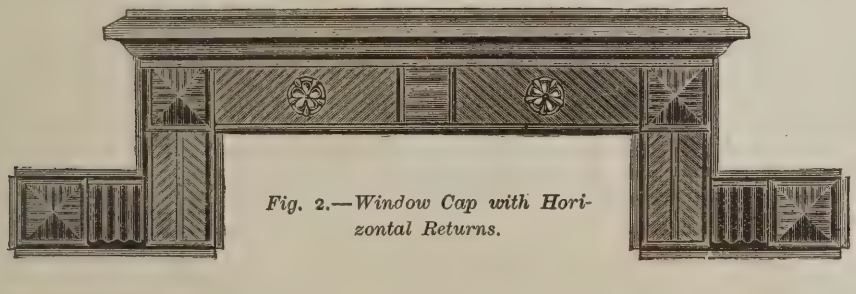


Fig. 2.—Window Cap with Horizontal Returns.

be revealed. The cuts shown upon this page represent devices suggested by the Sagendorph Iron Roofing and Corrugating Company, Cincinnati, Ohio, and are selected from new catalogues which they have in press. The first two engravings represent window caps, which are of special interest to our readers, from the fact that in their construction many of the traditions of the cornice trade are ignored. Whatever they possess of architectural style is unique, and there has been no servile copying from books on architecture or any attempt to imitate in corrugated iron the styles which have become identified with other materials which have preceded it. With the exception of the upper member, which is molded, the both designs are characteristic of the corrugated-iron industry. Corrugated frieze pieces are employed, the corrugations in these parts running diagonally. The corbels of Fig. 1 are also corrugated, a larger corrugation being employed in this place than in the others. What little semblance there is to a keystone in each of the designs is produced by the presence of a piece of corrugated iron. The raised panels in Fig. 2 are formed by the judicious mitering of corrugated pieces. These caps are designed for use upon buildings of frame skeleton, and are therefore provided with outwardly extending flanges, over which the abutting corrugated iron would finish. In Figs. 3 and 4 are shown another class of trimmings, no less important in connection with corrugated work, and yet varying in marked features from those to which attention has already been directed. Fig. 3 represents a finish along the edge of the roof. It consists of a sheet of iron that has been partially corrugated, and then bent at right angles in order to form an apron. The corrugated side would admit of a close joint with the roof, while the plain apron would make a finish over the verge board, or against other portions against which it may come. Our last engraving shows a ridge finish, beaded in the usual way, with corrugations in the aprons to fit the corrugations in the roof iron over which it would be placed.

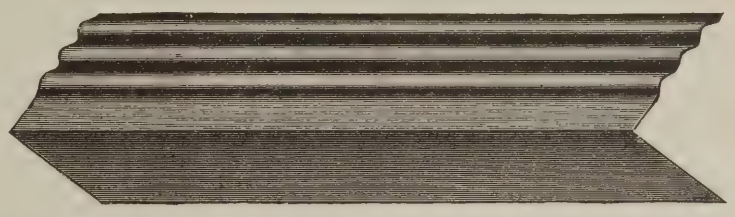


Fig. 3.—Verge or Flashing Strip with Longitudinal Corrugations.

The following item under the head of "Iron Paints," appears in a recent issue of the *Painter's Magazine:* "Under equal volumes iron paints cover more than those from lead; mixed with one-third of white lead they form an excellent mastic similar to that from red lead, and become very hard after drying for some time. As the iron oxide paint resists a strong heat, it is advantageously employed for painting parts of machines and boilers. The so-called anti corrosive paint may be made of equal parts by weight of whiting and white lead, with half the quantity of very fine sand of road dust, with colors at pleasure. The mixture, being made with water, can be used as a water color, but it is usually applied like an oil paint. The preparation of oil recommended for this purpose is 12 parts by weight of linseed oil, raw; 1 part of boiled linseed oil, and 3 parts of sulphate of lime, the whole well mixed. One gallon of oil thus prepared is used to 7 pounds of the paint. Paints containing silica are used for both wood and paint; they give a hard substance, which is very durable, and it is stated that when mixed with proper oils they will resist the action

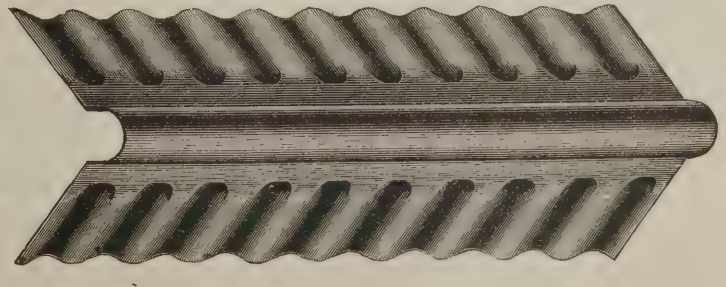
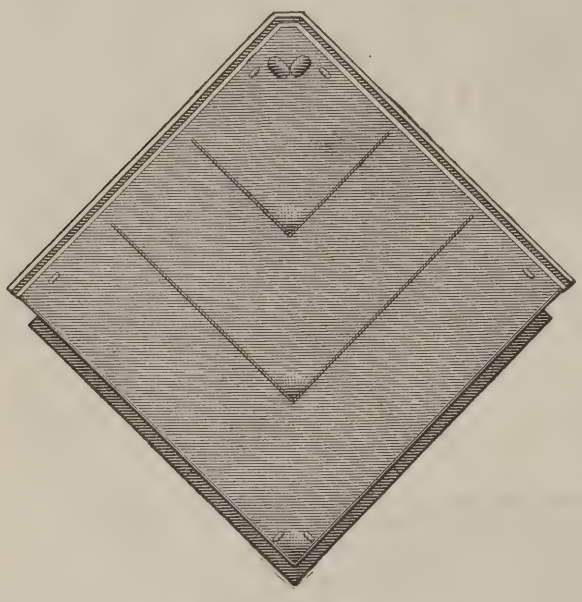


Fig. 4.—Roll Ridging for Corrugated Roofs.

of salt water and acids better than iron or lead paints ; that they cover well, and that in the case of wood they form a considerable protection against fire."

New Pattern of Sheet-Metal Tile.

We illustrated in these columns a short time since the Cortright system of sheet-metal tile, which is being introduced by the Cortright Metal Roofing Company, Broad and Race streets, Philadelphia, Pa. In the interval the company have put upon the market a new pattern of tile embodying the same principles of construction as were described in detail in the article referred to. A single tile of this shape is illustrated in the larger of the two accompanying engravings, while the second cut shows a group of four, and indicates the appearance a roof would have when covered with these goods. The design is in many respects more appropriate than any that has been given to sheet-metal tile in the past. The embossing, instead of being a meaningless ornament, conveys the idea of overlapping layers, suggestive of scales or shingles.



New Pattern Sheet-Metal Tile, Made by the Cortright Metal Roofing Company.

Hemlock.

The *Timberman* recently contained an article on hemlock lumber that is of interest to our readers. It is as follows :

Scarcely any of the woods that promise a greater or less competition with pine are making more rapid progress than hemlock.

Group of Four Tile, as Combined on Roof.

There is every reason to look for a larger production of hemlock from the Michigan mills this year than was ever made before, and for its introduction on its merits into consuming districts where but recently it was pine or nothing. This wood, as it spreads out south and east from Chicago and Michigan distributing points, will find itself met by hemlock from Pennsylvania, and find itself also in the presence of no mean competitor. For some time back, in Central and Southern Ohio, the hemlock from the forests of Western Pennsylvania has been coming in alongside of the pine from the lake markets and from central Michigan, and in many cases beating its rival in a fair fight. Hemlock has the advantage of comparative cheapness, and that is, of course, a telling one. The difference of a couple of dollars or so a thousand usually turns the scale in its favor, and in consequence its use is growing wherever it has come into market for sale upon its merits. Hemlock makes a reasonably light, strong, durable timber, and there is no reasonable objection to its free use in building. As it is bound to come more and more into market, as the stock of pine diminishes and its cost advances, it is proper the trade should understand that is is not a timber to be despised by any one. It is to a great extent the bill stuff timber of the future, though it seems its usefulness is not to be limited to so narrow a field as that and similar purposes. It proves a very successful material for shingles. Pennsylvania makers are turning out hemlock shingles with a 15-year guarantee behind them, and, what is more, they are laying them down alongside of pine shingles at prices which the latter can hardly match. It is said that the timber which the manufacturers in the Keystone State are now cutting is much better than much of that which they have sent to market in times past. As they are compelled to go further back from the stream, and gather in the trees standing higher up in the mountains, they obtain a better quality of timber, freer from shake, and showing a finer and closer texture. It appears to be well liked by consumers, who buy the shingles freely under a warrant which they cannot get with any pine shingles they are offered, and which they know would be practically worthless if it were made. Within the past year the development of the Western trade in Pennsylvania hemlock has been very marked, and the indications are that its rise is but just begun.

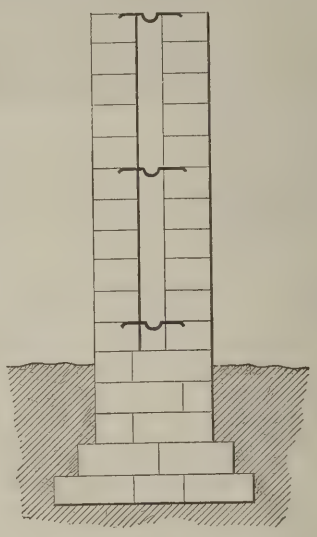
The marvelous growth of the railroad interests of the country is illustrated by the fact that old men are still living who took the first ride with Peter Cooper in the first steam locomotive in America. The locomotive was simply an old stationary engine, about the size of a barrel, mounted on a truck, and connected with the wheels by a crank. It pulled an old-fashioned coach, loaded with 42 passengers, 13 miles in 57 minutes. On the return trip it raced with two fast horses. The contest was nip and tuck, when the band slipped off the fly-wheel. Peter Cooper, the engineer, in attempting to replace it, lacerated his hand. The horses won the race. The first engine of really serviceable qualities was manufactured at York, Pa., by Phineas Davis. It made 1 mile in three minutes, drawing 40 persons, and it took the prize offered by the Baltimore and Ohio Road. Davis became the road's chief constructor of engines.

A new church edifice is projected at Greensburgh, Pa., upon the part of the parishioners of Christ (Episcopal) Church. A beautiful church edifice is in contemplation, to be erected on the site of the present structure. The building will probably be of stone, and it is anticipated that it will be the handsomest, as well as the most substantial, church in the town.

Hollow Walls.

BY ARTUS.

It is a surprising fact that builders and bricklayers should hold on so firmly to the old system of building solid brick walls. When a wall forms part of a building standing by itself, the advantages of erecting it in two sections or casings, with a hollow space between them, are considerable. In a recent number of this journal a correspondent asked for information on the subject, which is worthy of consideration at some length, if only from the fact of the small extent to which it is used in view of its advantages.



Hollow Walls.—Fig. 1.—Sketch Showing Construction.

Briefly, the construction of this description of walling is this: Two casings are built side by side at a distance apart of some two inches, and are connected together by iron or other ties, so as to practically constitute a single solid wall. We have first to consider the effect of leaving the hollow space, and then to ascertain the best details of construction.

Practical builders as a rule know something about the utility of hollow spaces in building, but not as applied to brickwork. Suppose that we wish to isolate a room from sound, how should it be done? Say that we have a private house located on a city avenue, and the object is to form a doctor's office or study free from noise. The matter would not be difficult. It would only be necessary to fit up double windows and double doors and the object is effected. Two rooms adjoin, and one can almost hear the conversation from one room into the other. Hang a second door with a 2 inch space between, and a shout in one room can scarcely be heard in the next. Or where one is annoyed by the constant din of passing traffic, the effect of fixing a close casement some 2 inches from the hung sash will be to silence the room in a remarkable manner.

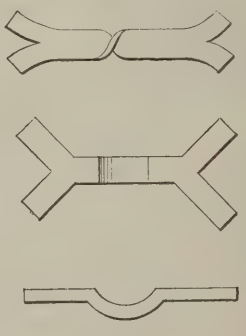


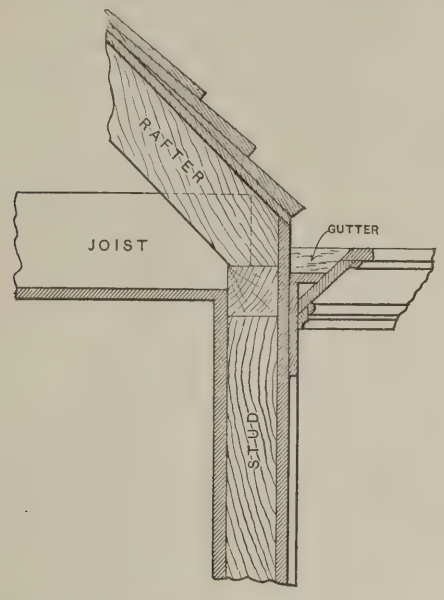
Fig. 2.—Iron Ties for Hollow Walls.

It will be plain, then, that an air space will prevent to a great extent the transmission of sound, but it is not so plain how that fact becomes an advantage in the construc-

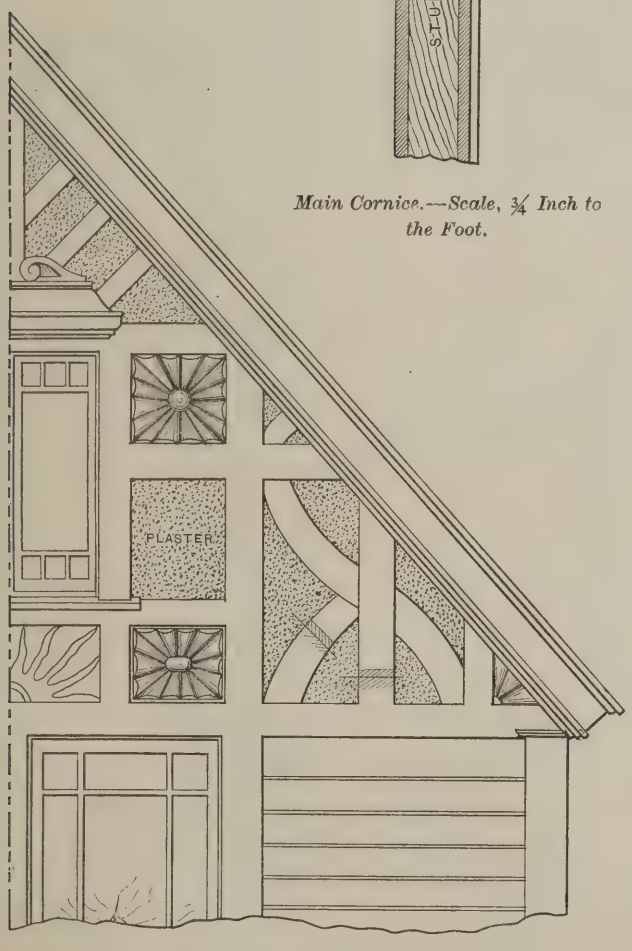
tion of walls. Certainly it might be of use in erecting the party-wall of a double house or in buildings erected close together, but in the ordinary construction of outside walls it would not be considerable.

But if the space prevents the transmission of sound it also prevents the passage of heat, and this is a matter of much more importance. A consideration of the scientific proofs of this would be interesting, but scarcely within the scope of this paper. It will be sufficient now to point out that there is a distinct similarity between sound and heat, inasmuch as they are both vibratory motion, subject to much the same laws, a portion of the heat or sound wave. The value of the two surfaces can by this be appreciated.

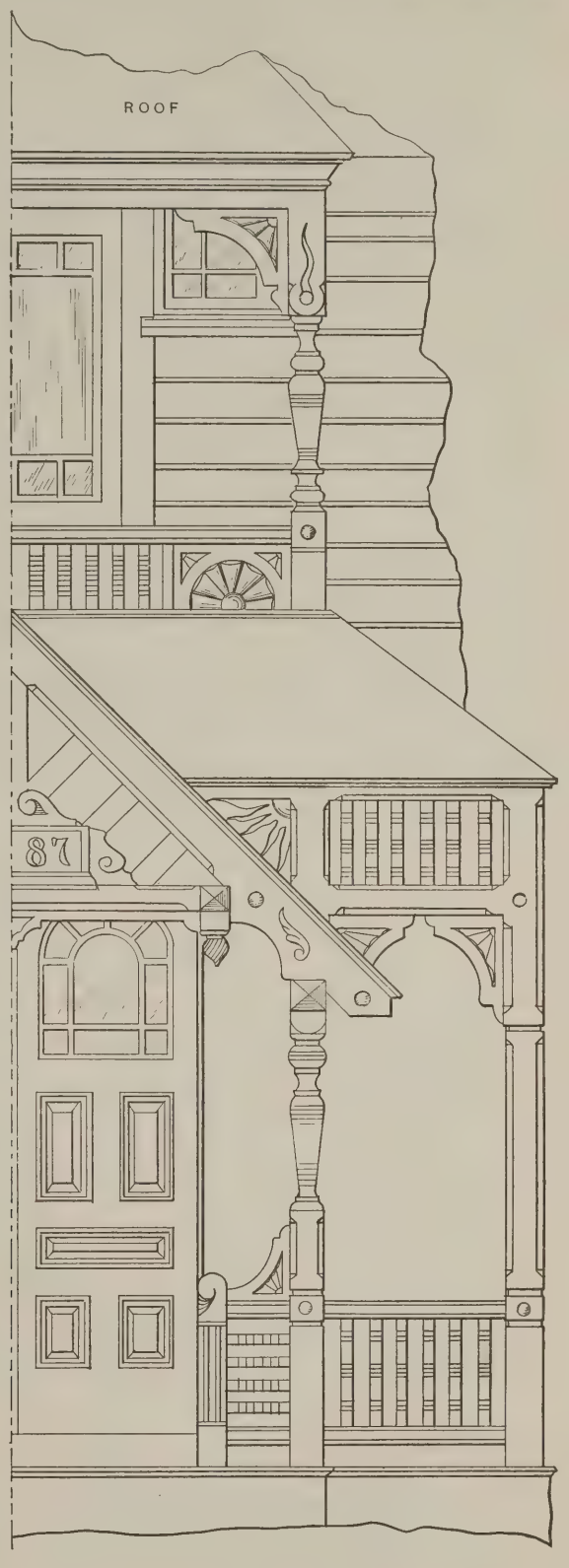
It has now been demonstrated that the air space excludes heat, and the advantage of this is not little. It can best be understood by analogy. In the winter we put a blanket on the bed to keep ourselves warm, and in summer we put a blanket around ice to keep it cool. The blanket prevents the transmission of heat through it, and prevent material, especially in the commoner varieties, and in solid walls of 8 and 12 inches and upward, the damp is very likely to penetrate. In hollow walls the wet can only get through the outer casing, where



Main Cornice.—Scale, ¾ Inch to the Foot.



Details of House Designed by J. L. Wees.—Half of Front Gable.—Scale, ½ Inch to the Foot.



Section of Porch and Balcony.—Scale, ⅜ Inch to the Foot.

one of the chief of which is the manner in which a greater portion of the heat or sound wave is reflected back by a plane surface of a wall and so prevented from entering a building. The proportion so reflected back will not depend upon the width of the air space. That would be practically the same if it were 2 inches or 6 inches. A certain amount of both sound and heat will be lost in its passage through the solid brick. But the greater portion which does not enter the building will be prevented, partly by reason of the bad conductivity of the air in the hollow space, and principally by the reflecting surface of the wall, which reflects

vents it from escaping in the one case and from entering in the other. So it is with hollow walls—the space forms a barrier to the heat, effecting a decided saving of fuel in winter and rendering the building cool in summer.

We have dwelt upon these advantages at some length, not so much because of their importance—although that cannot be gainsaid—as from the fact that they are so often altogether overlooked. Neither of the advantages mentioned, however, is the principal one. It is the almost entire exclusion of damp by hollow walls that is the chief gain in their adoption. Brick is an absorb-

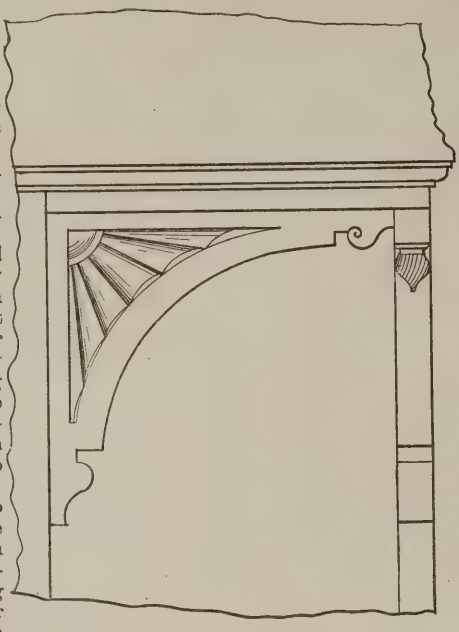
it falls to the bottom of the wall and runs away down the drains.

The construction of hollow walls is confined within very simple limits. In Fig. 1 is shown a section through an 8-inch wall illustrating the manner of construction usually adopted, which is as follows: The wall is erected on footings, if necessary, and of the required width to a hight just above the ground, but below the floor line. This portion is solid, and is built in the ordinary manner. The top is then covered over with bituminous asphalt, lead or some other suitable material, to form at once a damp-proof course and a gutter at the bottom of

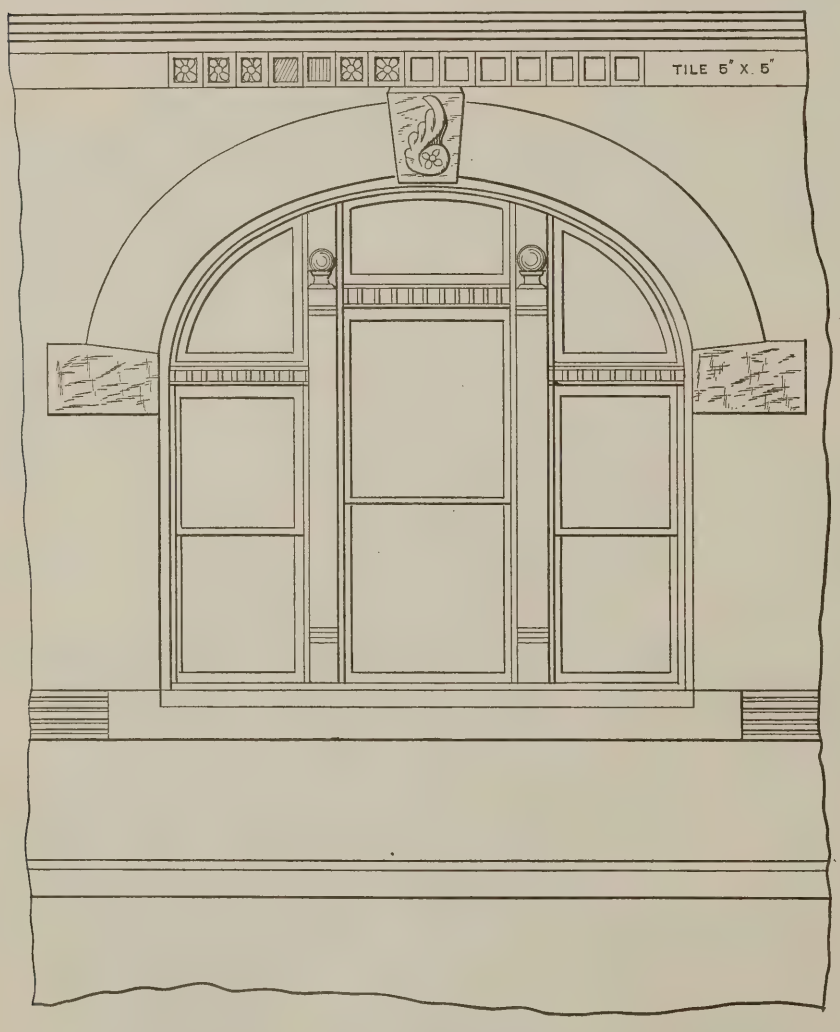
the cavity. The gutter is formed with the necessary fall and is connected with the drains. When the asphalt is in a fit state the hollow wall is built upon it in two casings, with a space of about 2 inches between them. These casings are connected together, by the insertion in every fourth or fifth course, of iron or other ties, at a distance apart of about 2½ feet.

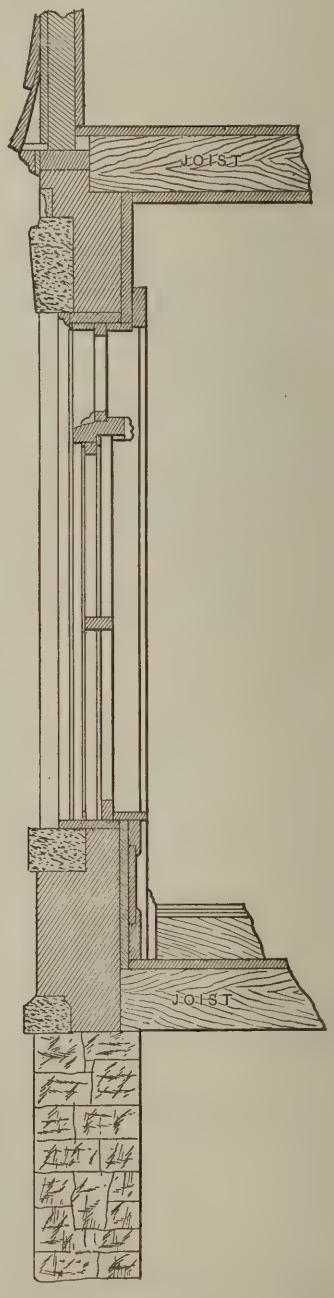
It is not important that any particular form of tie should be employed so long as they are inserted at frequent intervals. There are a number of different forms on the market, ofwhich the simplest and least costly are those shown in Fig. 2. Then there are cast-iron ties and others of brick. It is advisable that if the ties are of metal that they should be tarred, galvanized or by some other suitable means protected from the action of damp. The form, whatever it may be, must at least have provision for preventing any damp which finds its way through the outer casing from creeping across the tie, such, for instance, as the indentation or twist shown in those represented in Fig. 2. It should in addition have opened or jagged ends to afford a grip upon and hold together the two casings.

When a hollow wall consists of two casings, one of which is thicker than the other, there may be a question as to which one of the two should be placed on the outside. In every case the thicker casing should be built on the inside, as the greater portion of the weight of the building, such for instance, as that of the floor and roof timbers rests on the inside casing, and also can be made as to the use of hollow walls. Certainly they bring about a waste of a small portion of ground, but the land would have to be exceedingly valuable to make bond. Having regard, then, to the great advantages of this system of building walls as above explained, and to the very slightly increased cost, it is to be regretted that it is not very much more generally employed.



Bracket on Bay Window.—Scale, ½ Inch to the Foot.





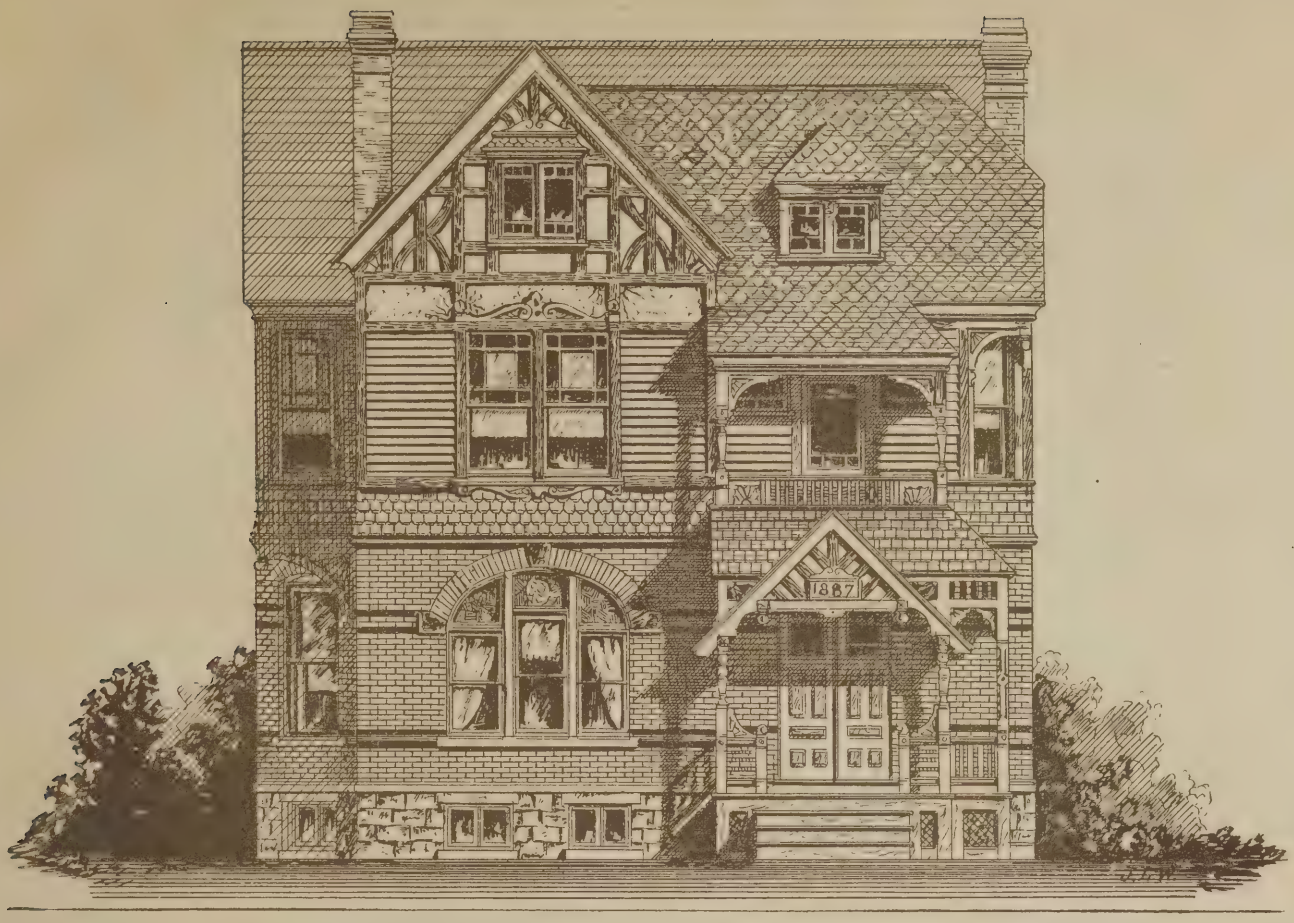
Details of House Designed by J. L. Wees.—Elevation and Section of Front Window.—Scale, ⅜ Inch to the Foot.

Alarming reports are again started concerning the safety of the magnificent vaulted ceiling of the Assembly Chamber at Albany. The weight of the ceiling is about 1700 tons, but it is held up by heavy trusses, and, although several wide cracks are visible, there is said to be no danger, aside from the possible dropping out of a stone. The deflection of the walls from the perpendicular does not exceed ½ inch since 1881, according to the surveys of Engineer Singerland, and the settlement has not been great, considering the enormous proportions of the building. The ceiling cost about $500,000.

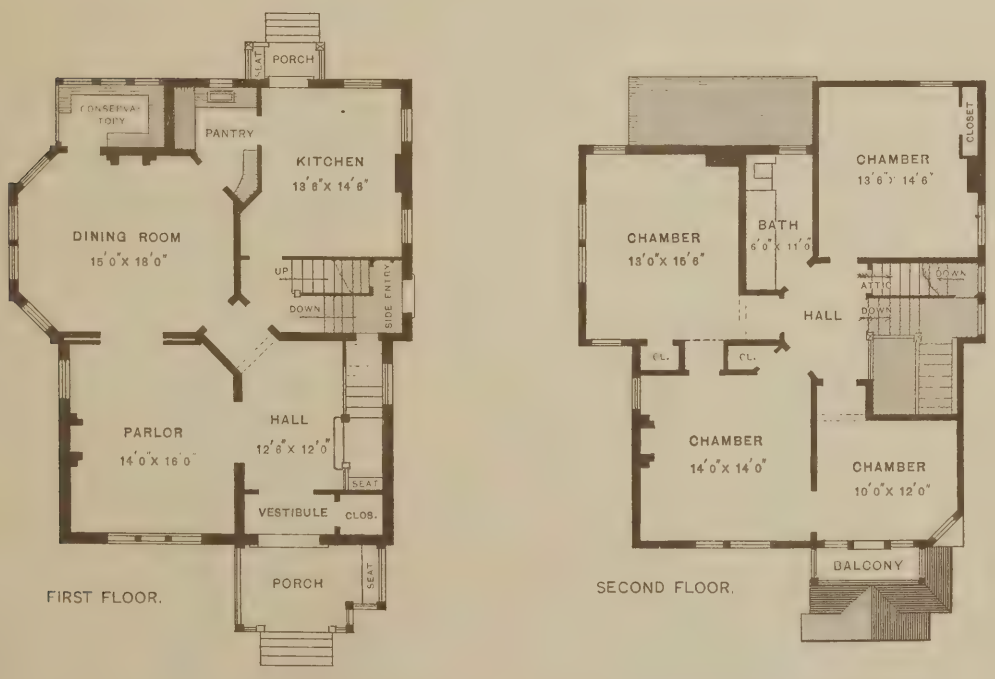
Herr Schiller, a well-known German architect, reports some facts which are of interest as indicating the radius of the circle of protection of good lightning rods. On June 17 last, at the village of Mottingen, lightning struck a pear tree 33 feet high. On one side, 115 feet away, was a school house with a rod 56 feet high. On the other side was a church, 328 feet away, and having a lightning rod reaching up 154 feet. Both rods are well placed and had worked well when tested, and the level of the foot of the tree is about the same as that of the two buildings. It is evident, then, if the facts have been accurately reported, that the radius of the circle of protection is not more than twice the height of the rod.

because it will more surely effect the exclusion of the heat, damp and sound.

When the casings are each only 4 inches in thickness, it is advisable to use mortar containing a proportion of cement, as the area of surface adhesion of the bricks is comparatively small, and a good quality of mortar therefore necessary. Few objections this important. Then it has been said that the wall is much weaker than a solid one, but this is entirely erroneous. Unquestionably it is weaker to some extent than a wall built in the bond known as "Old English," but it is as strong, if indeed it is not stronger, than brickwork as constructed all over the country in the ordinary running



Front Elevation. Scale 1-8 inch to the foot.

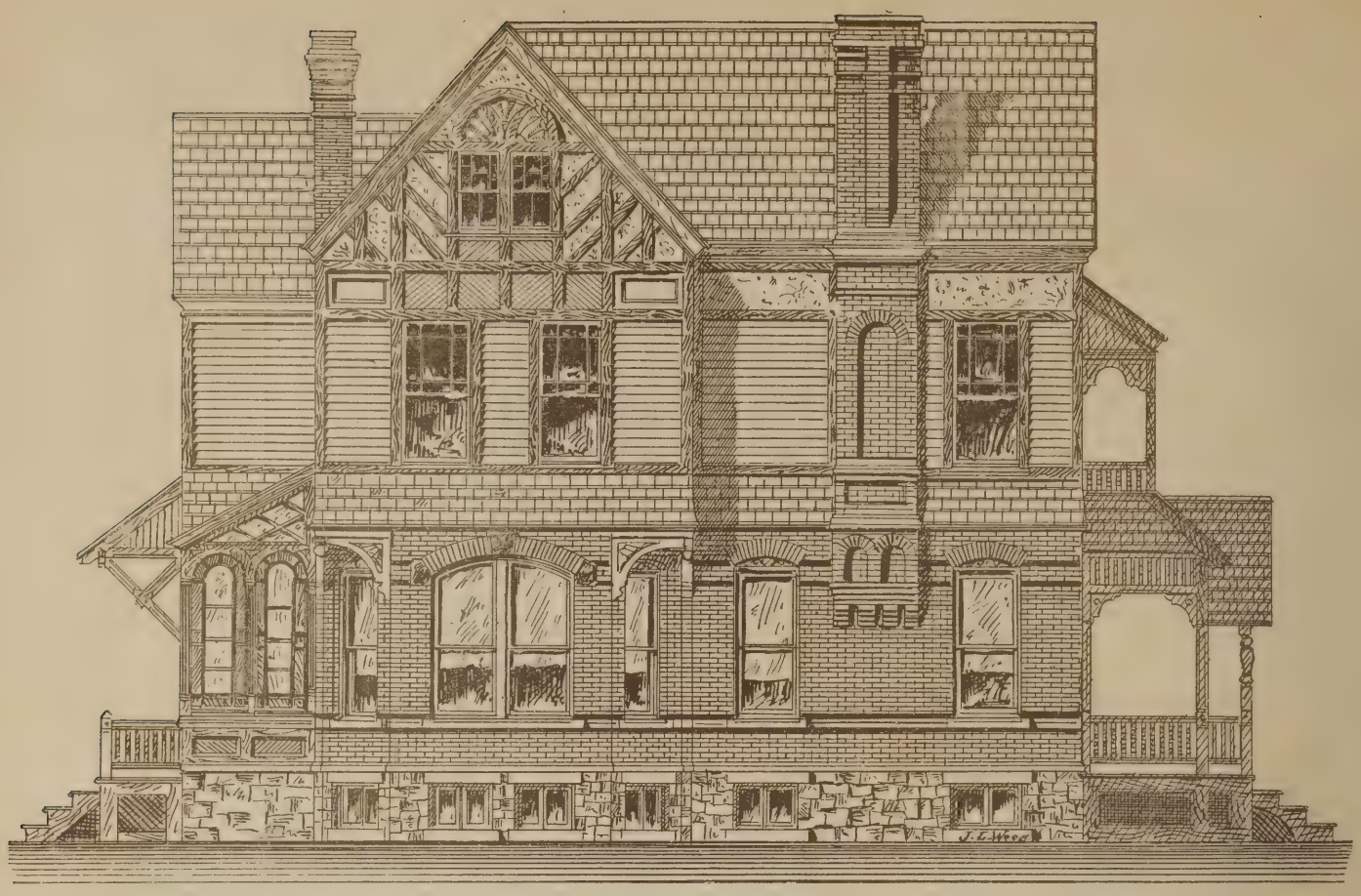


Floor Plans. Scale 1-16 inch to the foot.

Brick and Frame House.

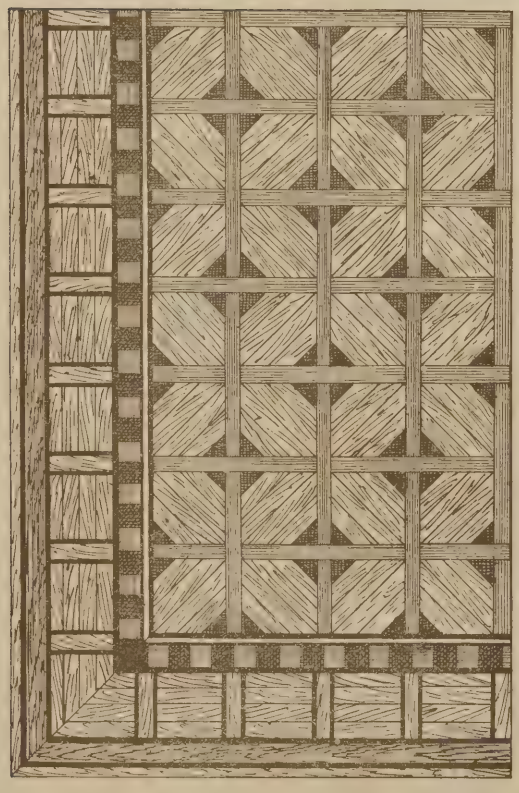
Designed by J. L. Wees, St. Louis.

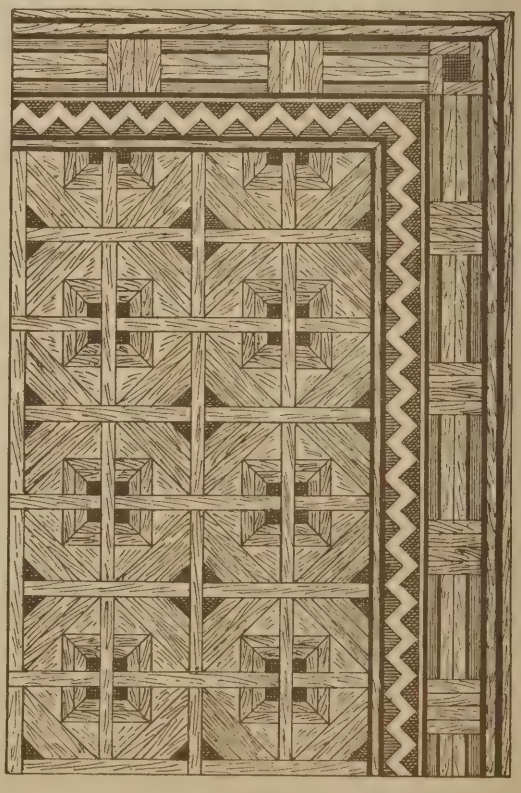
Carpentry and Building, May, 1887.
Plate XVII.



Side Elevation of House Designed by J. L. Wees.

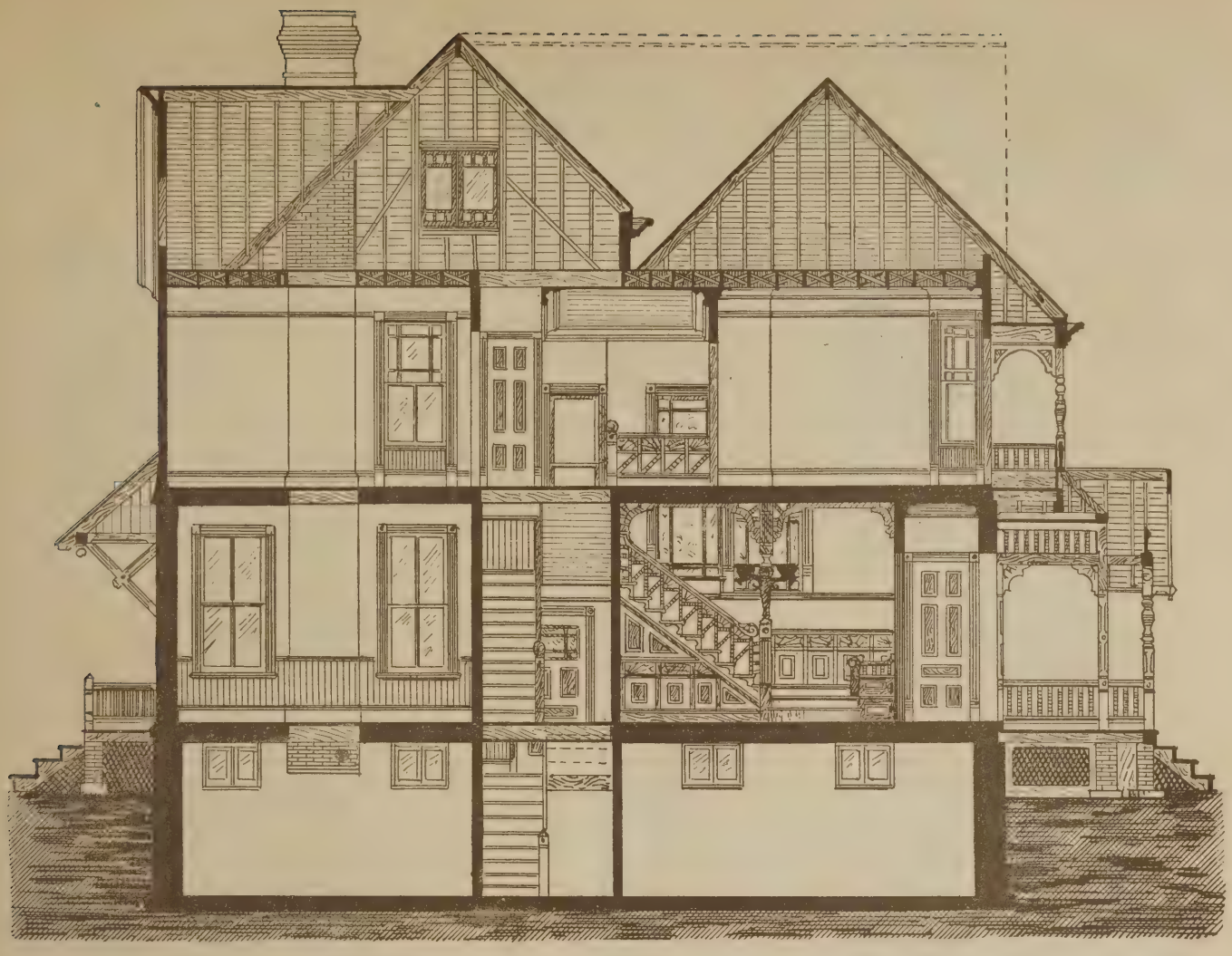
Scale 1-8 inch to the foot.





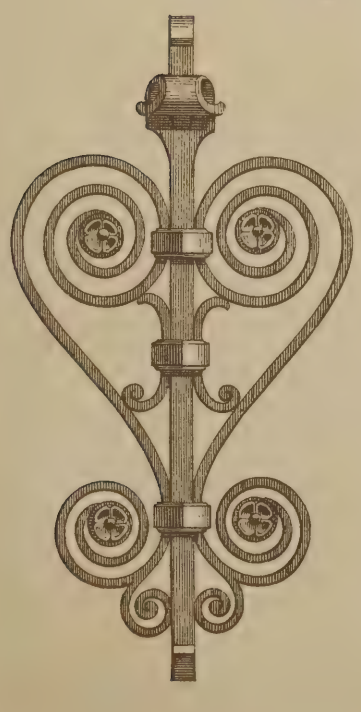
STUDIES IN PARQUETRY FLOORS.

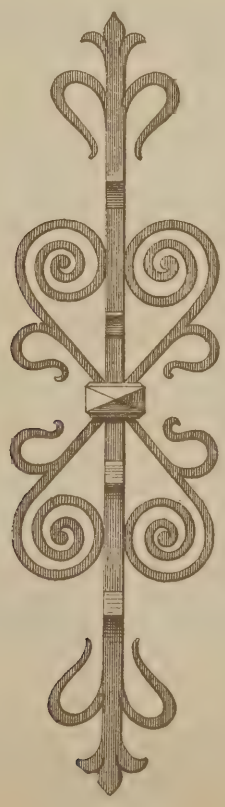
By R. Fischinger.



Vertical Longitudinal Section of House Designed by J. L. Wees.

Scale 1-8 inch to the foot.





Ornamental Wall Anchors.

Fig. 3.—Detail of Pediment in Fig 1.

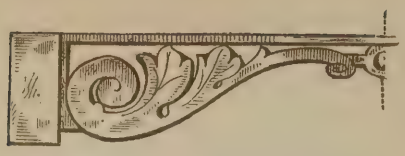


Fig. 2. –Fretwork under Shelves in Fig. 1.

Fig. 4.—Section at A in Fig. 1.

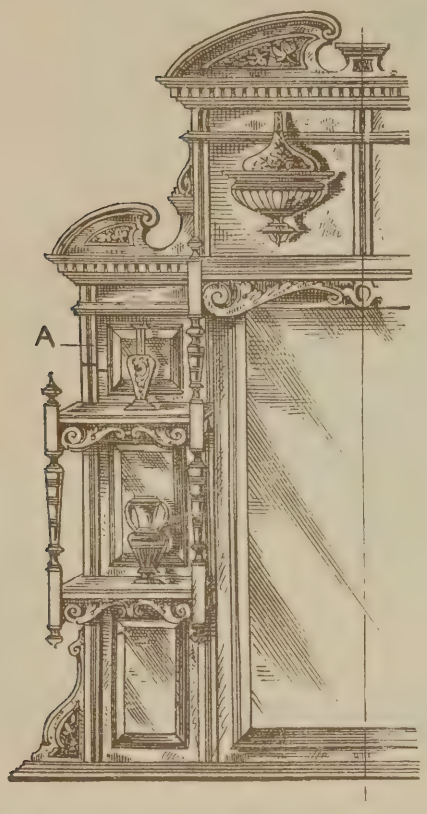


Fig. 1.

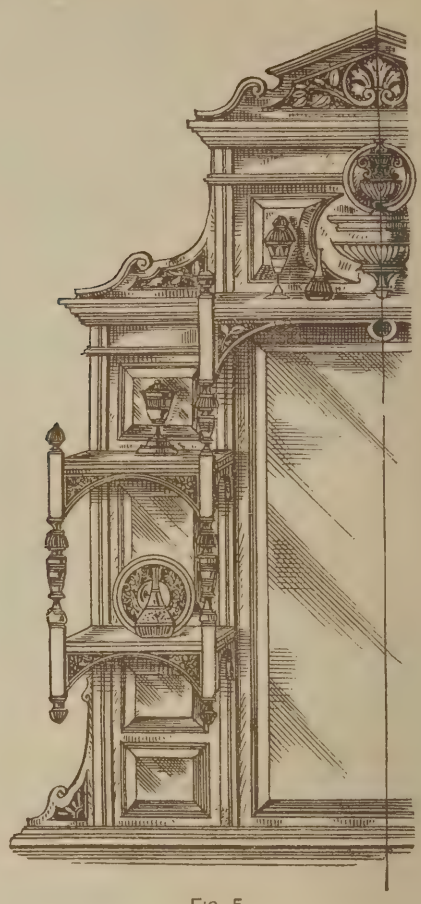


Fig. 5.

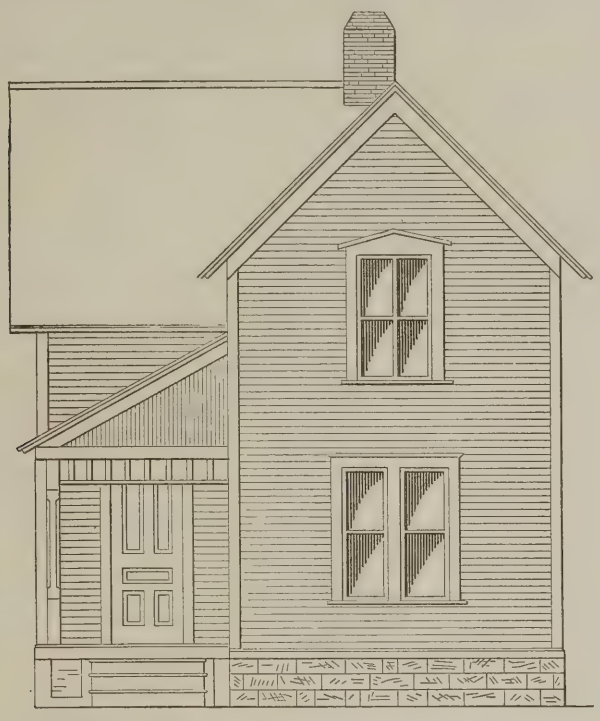
DESIGNS AND DETAILS OF OVERMANTELS.

Vestibule Floor, in Mosaic and Tile Work.

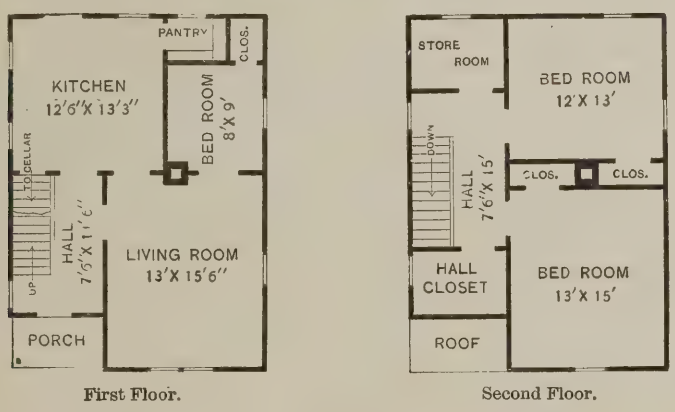
CORRESPONDENCE.

Small Frame House.

From A. E. GREENLAW, *Minneapolis, Minn.*—I inclose floor plans and front elevation of a small frame house, designed with special reference to convenience and lowest cost. A small bedroom is placed in the lower story, and a large hall, with straight staircase is provided for convenience in moving furniture up and down stairs. The cost of the building in this locality would be about $1000.



Design for Small Frame House, Contributed by A. E. G.—Scale, ⅛ Inch to the Foot.



First Floor. Second Floor.

Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.

How to Split Paper.

From W. D., *Philadelphia.*—I notice in a recent issue of the paper a question about splitting paper. If you see fit to lay the following before your readers, I shall be glad to have you do so. Get a piece of plate glass and place on it a sheet of paper, soaking the latter thoroughly. Then with care and a little dexterity the sheet can be split by the top surface being removed. The best plan, however, is to paste a piece of cloth or strong paper to each side of the sheet to be split. Then, when dry, pull the two pieces apart, violently and without hesitation. It will be found that a portion of the sheet of paper has adhered to each of the two pieces of cloth. Soften the paste in water, and then the paper can be easily removed from the cloth. This process is generally explained as a matter of curiosity although it can be utilized in various ways. For instance, if we want to paste in a scrap book a newspaper article that is printed on both sides of the paper and we possess only one copy of the paper. In such cases it is very handy to know how to split a piece of paper so as to save both sides. A piece of paper, as may be imagined, when split in this way is more transparent than before it was submitted to the preparation. The printer's ink is also somewhat duller. Otherwise the two pieces present the appearance of the original.

Method of Developing Circumference of Circle.

From J. H., *Brooklyn, N. Y.*—In your issue for March you published, under the head of the "Circle Set Square," a graphical method for developing the circumference of a circle on a straight line, an operation frequently required in the arts. I herewith inclose another method, hoping it will interest the readers of your paper who may have occasion for such operations. I have also inclosed a solution of the same. The ratio of the circumference to the diameter being incommensurable, the development can only be in any case but an approximate one, yet near enough for all practical purposes.

Let *anbm* = circumference.
Let *ab* = diameter.
Then will *ob* = radius = *R*.
Draw chord *cf* = *ob* = *R*.
At *b* draw tangent *hk* intersecting the prolongation of radius *oc* at *h*. On tangent *hk* and beginning at *h* lay the radius *ob* three times, thereby giving the length *hk*; join the points *a* and *k*, then will the line *ak* be very approximately equal to one-half the circumference.

Solution.—The triangles *o b h* and *o e c* being similar, we have the proportion

$$h\,b : c\,e :: o\,b : o\,e \therefore$$
$$h\,b \times o\,e = c\,e \times o\,b,$$
$$\text{and } h\,b = \frac{c\,e \times o\,b}{o\,e} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

In triangle *o e c* we have

$$(o\,e)^2 = (o\,c)^2 - (c\,e)^2 \quad (2)$$

But $(o\,c)^2 = (o\,b)^2 = R^2$ and $(c\,e)^2 = \left(\frac{1}{2}\,R\right)^2$

Hence, by substitution, equation (2) becomes

$$(o\,e)^2 = R^2 - \left(\frac{1}{2}R\right)^2$$
$$\therefore o\,e = \sqrt{R^2 - \frac{1}{4}\,R^2} = \frac{1}{2}R\sqrt{3}$$

Substituting this value of *o e* in equation (1), we have, since $c\,e = \frac{1}{2}\,R$ and $o\,b = R$,

$$h\,b = \frac{R\sqrt{3}}{3} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

But $b\,k = h\,k - h\,b$ and $h\,k = 3\,R$

$$\therefore b\,k = 3\,R - \frac{R\sqrt{3}}{3} = \frac{R(9 - \sqrt{3})}{3} \quad (4)$$

The triangle *b a k* gives

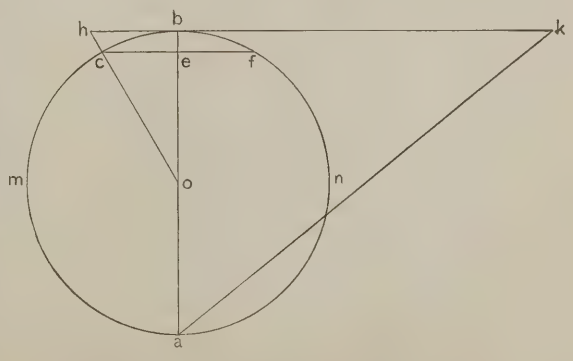
$$(a\,k)^2 = (b\,k)^2 + (a\,b)^2 \quad (5)$$

But $a\,b = 2\,R$. $\therefore (a\,b)^2 = 4\,R^2$ and from equation (4) $(b\,k)^2 = \frac{R^2(84 - 18\sqrt{3})}{9}$

Substituting in equation (5) these values of $(a\,b)^2$ and $(b\,k)^2$, we have

$$(a\,k)^2 = \frac{R^2(84 - 18\sqrt{3})}{9} + 4\,R^2$$
$$\therefore a\,k = \sqrt{\frac{R^2(84 - 18\sqrt{3})}{9} + 4\,R^2} = \sqrt{\frac{R^2(120 - 18\sqrt{3})}{9}} =$$
$$\frac{R\sqrt{120 - 18\sqrt{3}}}{3} = R \times 3.141533.$$

But $\pi = 3.14159$, hence the error is less than $\frac{6}{100000}$ of the radius.



Method of Developing Circumference of Circle.

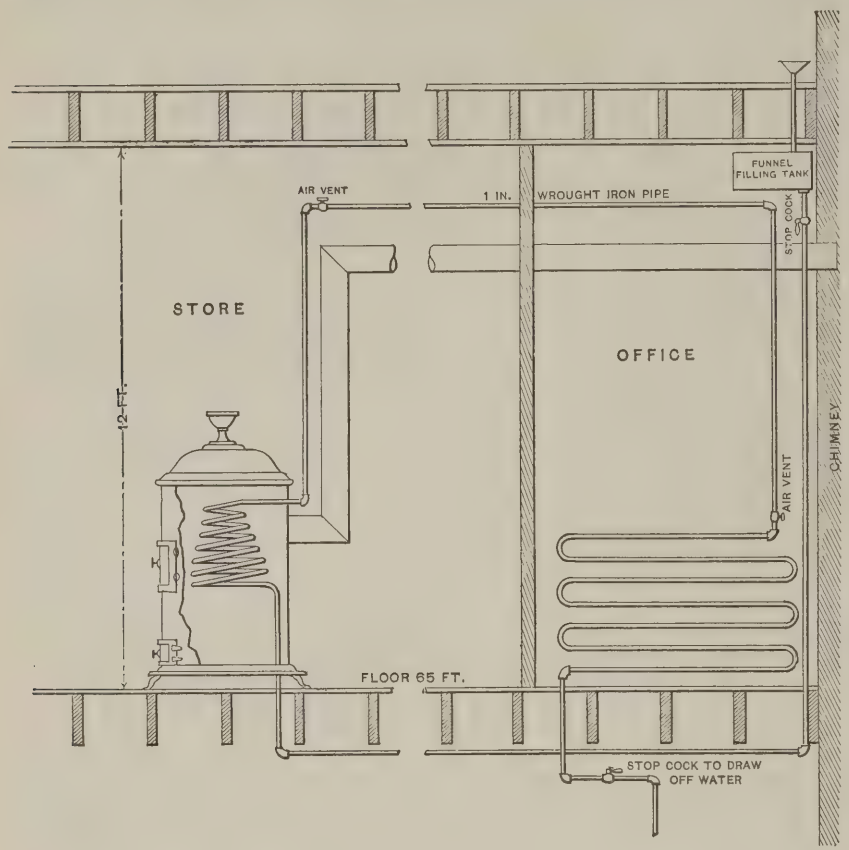
Measuring Stonework.

From J. B. P., *Hartsville, Ind.*—Will some of the practical readers of *Carpentry and Building* explain for my benefit the prevailing custom in measuring stonework? For instance, when I hire a mason to furnish all material and build a foundation for a house, do I pay him for the work according to masons' measurement for laying up stone, or do I pay him for the actual amount of stone in the wall?

Note.—We shall be glad to have our readers respond to this inquiry, but, in passing, we would remark that in most cases such questions are settled by local custom rather than by any general rule. If our correspondent is in dispute with masons on points of this kind, in all probability the decision will turn on what is the custom in the community in which the contract was made and the work performed.

Hot Water Heating.

From J. F., *Brunswick, Me.*—Several years since, while riding in a car heated by hot water, I asked myself why my office could not be heated from my store stove. Following out the idea, the result was substantially as presented upon the inclosed diagram. The whole arrangement was made to conform to conditions then existing



System of Hot-Water Heating Described by J. F

in the stove, which may not be a most desirable form, but the success of the scheme justified my expectations. The arrangement has been so much of a comfort that I offer it to you, if you think it will help any of the readers of the paper. The diagram, in which no attempt has been made to conform to scale or proportion, explains itself. The circulation of the water when the pipes are full is perfect. It is run with a closed circulation, there being no expansion tank. Attention to replacing the waste from small leaks is all there is of labor connected with it. Whenever there is a fire in the stove the office receives the benefit of it. The increasing interest manifested in hot-water heating prompts me to make this contribution to the list of experiments.

Vitriol-Proof Floor.

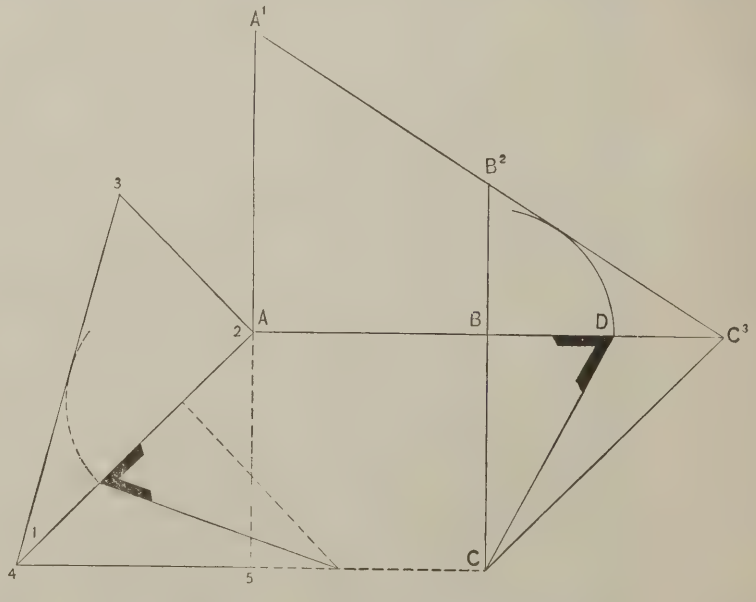
From W. E. P., *New York.*—There are three styles of floor which can be used under vitriol tanks and which are perfectly acid-proof and can be laid without any considerable amount of skill. The first will be much lighter than either of the others. The materials are roofing slate and asphalt. The latter is heated in a boiler in the usual manner and a good coat given to a strip of the floor. This coat must be thick enough to permit the slate being bedded in it. Each slate must have a good support all over the lower surface. This will tend to prevent cracking. The slate are laid edge to edge, face down—that is, the sharp or clean-cut edge is put down. When one row has been laid another strip of floor is covered with asphalt and another row laid. It may be just as well to lay them so that they break joints like stonework. When the floor is covered and the whole is cool a coat of asphalt is given to the floor. Before the final coat, however, it may be best to fill or "pay" all the seams so as to bring them up to the general level. A harder surface may be made by mixing fire clay with the asphalt or with coal tar. It should not be so thick that it will chip when a drop of it is allowed to cool on a piece of slate. Such a floor as this will weigh from 4 to 8 pounds per square foot, according to the thickness of the slate used. If the time and labor can be spared to put the slate into the hot tar before laying some small advantages might be gained.

The next style of floor is made by using slate tiles instead of slate. They can be had of any thickness from ½ an inch to 1 inch. The floor is prepared in the way just described and the tiles bedded in the pitch. Large thin tiles can be used, and as they have straight sides and square corners, they fit almost as closely as woodwork. After the floor is cool the seams are overpayed and the whole covered with asphalt, or pitch and clay. Tiles of slate can be had in a great variety of sizes, and the floor may be laid without waste. Slate weighs about 14¾ pounds per square foot, 1 inch thick. From this the weight of the floor can be got for any thickness of tile. If pottery tiles can be had in this market they would make a good floor, and somewhat lighter than the brick floor, which is next in the list. This latter is perhaps as good a floor as can be made, on account of its great durability and the cheapness of the materials. The wood floor is prepared as before by giving it a good coat of asphalt. The bricks are put into the hot asphalt and allowed to remain till they have taken up as much as they will, or at least till the outside is well filled. They are then taken out with a pair of tongs and laid while still hot. When one strip of the floor is finished another strip is covered with the first coat and the bricklaying is continued. The bricks or tiles are, of course, laid flatwise. Bricks sufficient to cover one section of floor are put in soak at a time The seams are payed and the top coating given as described in the other cases. A floor of this kind is proof against anything except oil. Acid tanks have been made in this way. The sides as well as the bottoms can be of brick, and when so constructed acid can be boiled in them by means of the usual steam-pipe.

A brick floor laid in this way is very durable and does not leak, even after the top coat has been worn off by use. It will not leak unless the bricks are disturbed. This is not likely to happen if the coal tar, asphalt or pitch used has been well thickened with clay, slate dust or powdered bricks. The first construction described makes a good roof, while the others are useful for floors of damp cellars and places where it is desirable to keep moisture out or in. If hard-burned bricks can be had, the style last described will answer for yards, ovens and numberless other places.

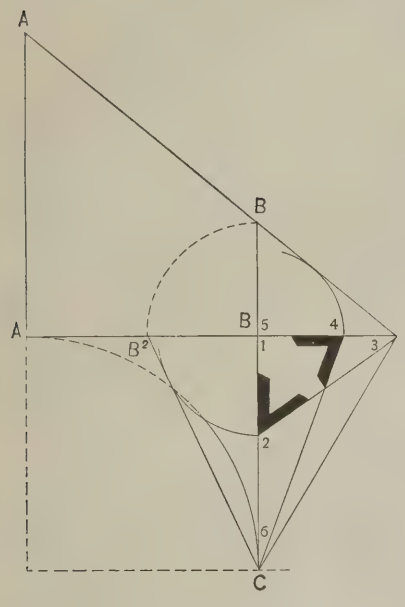
Roof Bevels.

From STEP LADDER, *Ottawa, Ont.*—The subject of bevels in connection with roofing has been so thoroughly ventilated from time to time in your valuable paper that most of your readers by this time have become familiar with the many methods that have been presented. Yet I think the subject should not end here, but that we should extend it into another field of our work, in which the bevel plays an important part—namely, hand-railing. The importance of correct bevels in this, the most beautiful art in joinery, will be admitted by every hand-railer, and because of its importance I deem the subject to be one worthy of discussion in the pages of this paper. Many works on hand-railing give to their readers little information on the subject. True, they show the lines for obtaining the necessary bevels for the joints, yet the why and "the wherefore" is often veiled in Egyptian darkness, requiring an exercise of faith on the part of the workman not at all in keeping with this scientific age. The method of drawing on cardboard and cutting the parts so that the various positions



Roof Bevels.—Fig. 1 of Diagrams Accompanying Communication from "Step Ladder."

of plan and elevation are seen in correspondence has many advantages over flat drawings, as the relation of things can be seen at a glance, instead of the laborious work of following a lettered drawing, in which the description is found in one part of the book and the drawings in another. The method which I have found to be most satisfactory in the course of study of the subject was to form blocks of wood to the plans. Mark the pitches of the rail on the side, and cut them to the marks. In order to find bevel angles, square from the sides



Roof Bevels.—Fig. 2 of "Step Ladder's" Diagrams.

down and across, as the joints lie square to the tangents and face of the plan thus formed. This gives a section of the solid containing the direction for the butt joint of the rail In this way, one soon becomes familiar with the angles and their relations, and the why and the wherefore soon become apparent. I submit a few methods copied from various sources for finding bevels, trusting that your roofing bevelers will give the subject "backing."

In Fig. 1, A B C represents the ground plan of a wreath having equal pitches; A^1 B^2 C^3 represents the tangents in elevation,

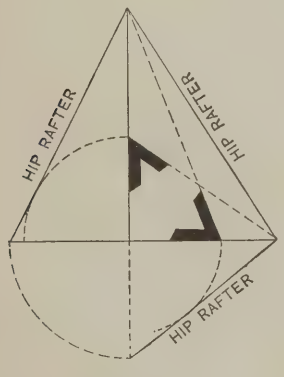


Fig. 3 of "Step Ladder's" Diagrams.

while B D C shows the angle in which the bevel section is shown. In order to show the similarity of hand-railing bevels with roofing, 1, 2, 3 represents a hip rafter having a similar pitch to the wreath A B C. On finding the bevel for backing the hip in the ordinary way, A will be found to agree with that shown at B D C. In Fig. 2, A B C represents the ground plan of a wreath having unequal pitches, while A B and B^2 C represent the pitches. The bevel sections are shown at 1, 2, 3 and 4, 5, 6. The similarity of the bevels with roofing is shown at Fig. 3.

Styles of Wainscoting.

From J. M. V., *Louville, N. Y.*—"W. P.," of South Boston, Mass., some time since, asked for new style of wainscoting. As I have recently put up two different wainscots that vary from the old style, I send drawings of them, so that they may be published for the benefit of this correspondent and others who may be interested.

Note.—The accompanying cuts have been made from our correspondent's sketches.

Ice On the Eaves of Roofs.

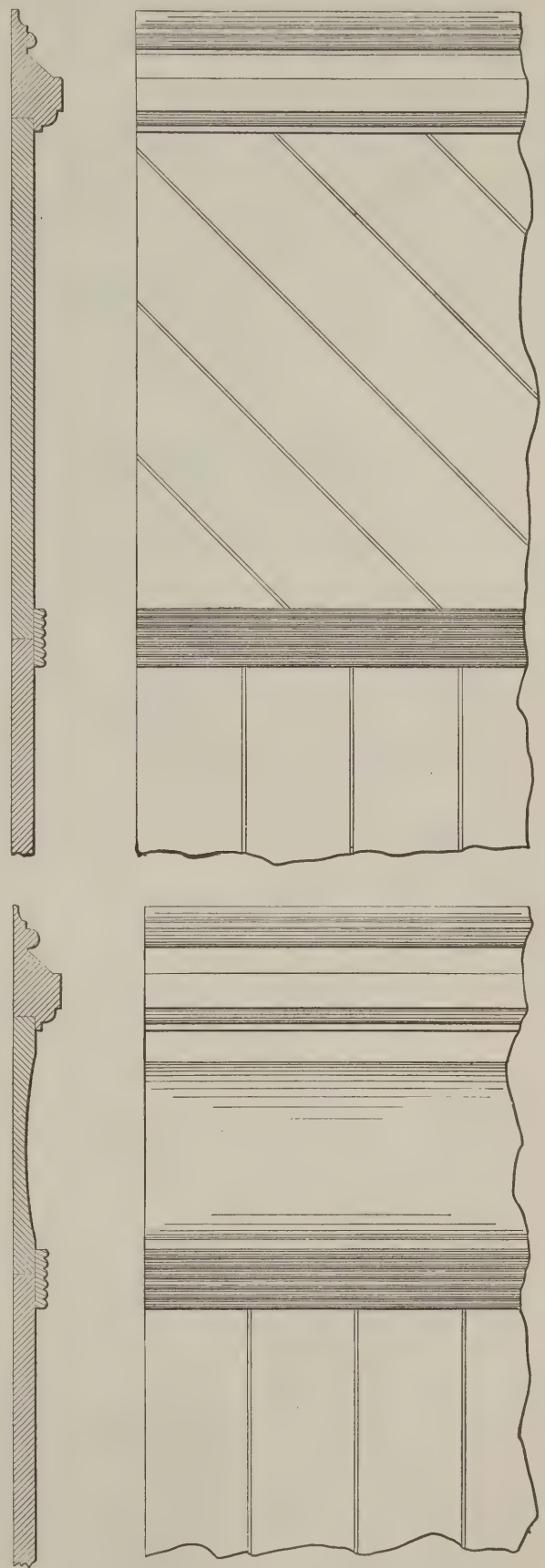
From E. D. M., *Buffalo, Wyoming Ter.*—I notice in the March issue of *Carpentry and Building* a communication on the subject of ice on the eaves of roofs. As the question does not seem to be very satisfactorily answered, I would like to propose it again, putting the question in a little different form. The trouble is caused by the snow melting in one place and running down and freezing in another, thus forming a dam and causing leakage in places which it is difficult to discover after the trouble is over, and which, under ordinary circumstances, would give no trouble at all. I have read your opinion concerning the matter. One way of overcoming the trouble is to sink a gutter in the roof at the proper place, which, being kept warm by the warm air of the garret, will always carry off water when there is any to carry off. The second method is to build a second or false roof over a portion of the old one.

Note.—Almost identical suggestions have been offered by another correspondent on this subject, and what we have said to him will, in a great measure, apply in this case. The only difference appears to be in laying the gutter at a point where the warmth will have the effect of keeping the gutter open and allowing the water to run off. With the false roof idea we have very little sympathy, because it would seem to be going a long way around. As suggested in discussing this question in the past, the best plan is to provide for the proper construction of the roof in the first place.

A Question in Patent Law.

From F. P. K., *Doylestown, Pa.*—Kindly inform me, through *Carpentry and Building* whether a patent on a machine to do a certain kind of work will allow a person to do the same kind of work on another machine made before the first machine was patented. The original machine does the work a different way, but produces the same result. The original machine is also patented. I do not think that the kind of work done by it is patented, for the facts of the case are that several kinds of work are produced by the same machine. One of the productions of the machine is now made by a new machine, specially constructed for it, and the patentee claims that no other machine can make it.

Answer.—The patentee in this case very evidently claims much more than he has any right to claim. In some instances goods are patented as new articles of manufacture. In such cases the machines on which they are produced may or may not be patented, but, however the goods may be produced, they



Designs of Wainscoting, Submitted by J. M. V.—Scale, 3 Inches to the Foot.

are infringements upon the patent relating to them unless they are made under the authority of the one holding the patent. Our correspondent seems to have an idea of this state of affairs, and mentions in his letter that there is no patent on the goods themselves. In that case we can see no possible reason for the patentee of the last machine making such a sweeping claim. There is another point to which attention may be directed in passing, and that is, that the machine which is claimed to be an infringement of the one more recently patented was in existence long before the other came into notice. Accordingly, the question turns upon the fact of the goods themselves being common property or a patented specialty. Of course the facts must determine this point.

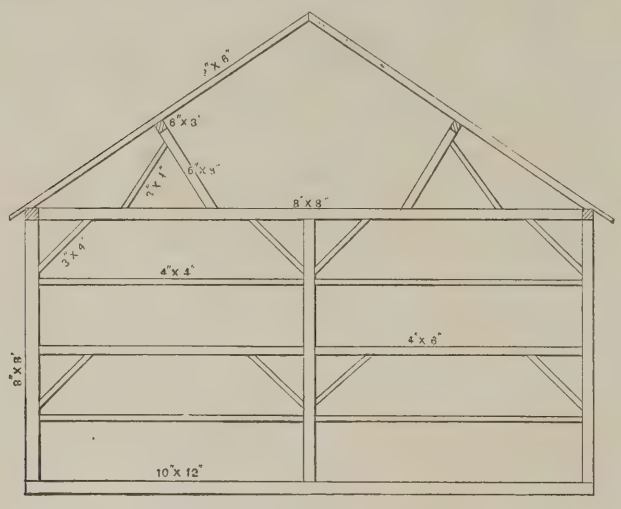


Fig. 1 of Sketches by J. B. R.

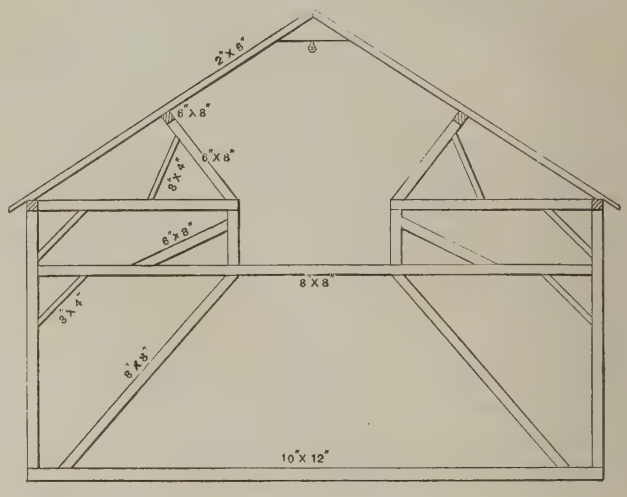


Fig. 2, by J. B. R.

Barn Framing.

From J. B. R., *Dean, Ohio.*—In answer to "H. H. B.'s" request for assistance in framing a barn, I inclose three sketches which, I think, can be followed with the assurance of securing a strong, serviceable building. My mode of framing will make a barn of finer appearance from the outside than one with a gambrel-roof. Referring to the drawings, Fig. 1 represents the mode of framing the end bents; Figs. 2 and 3 show alternative ways of framing the inside bents. Fig. 2 is preferable on account of placing a hay carrier in the comb of the roof. In the neighborhood in which I live there are many large and commodious barns, and a number of these are built according to the plans I inclose. There are none in this vicinity with gambrel-roofs.

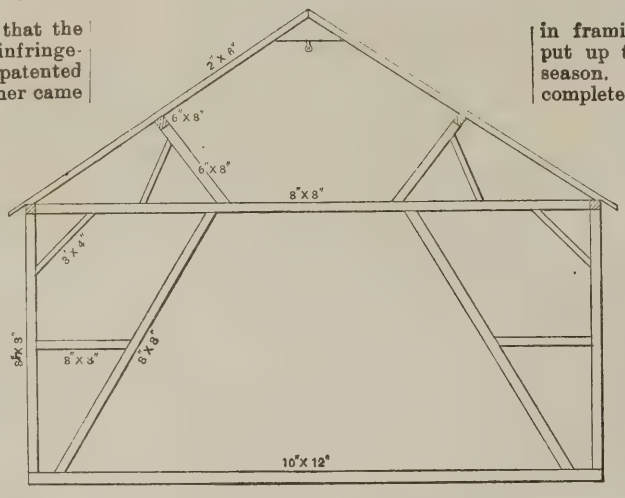


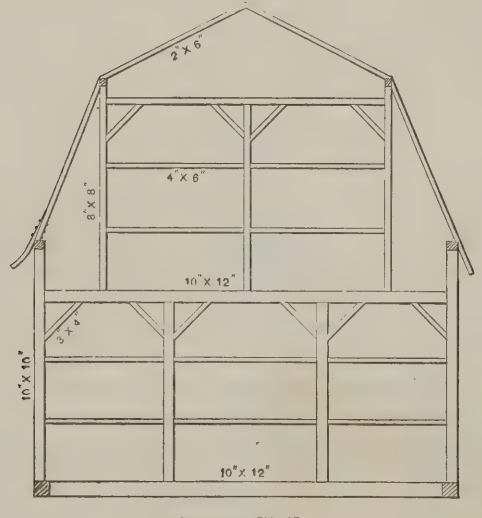
Fig. 3, by J. B. R.

From A. W. K., *Albion, N. Y.*—I inclose a sketch of a gambrel-roof which may be of interest to some of the readers of *Carpentry and Building* outside of the State of New York. The purlin posts, it will be observed, are pretty close to the main posts. They set in $\frac{1}{16}$ of the width of the building, consequently they make the run of the first set of rafters the same as the rise of the upper pitch or set. I admit that I am somewhat inexperienced in barn building. I have been much interested in the diagrams published in the March issue. There are some very good framing plans among them, but, for my part, I would prefer to have the purlins run to the sill, for the reason that a barn constructed with beams is stronger. In this vicinity we think it is about time to commence pinning the purlin posts to the beams, for the reason that the wind does have some effect on a roof when the purlins are not fastened. If there are any improvements to be had further in regard to the shape of gambrel-roofs, I, for one, shall be pleased to hear from those who can suggest them.

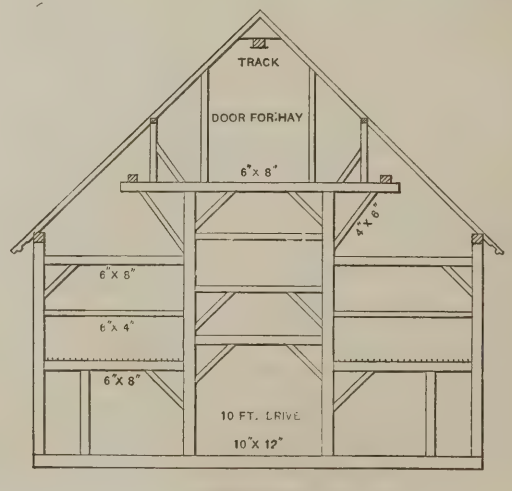
From J. E. M., *Cookport, Pa.*—In reply to "C. A. W.," of Almont, Mich., I would say that I have had considerable experience in framing and raising barn buildings. I put up three or four such structures every season. I use a rig for raising the bents complete, after putting them together on the ground. I raise them at one pull with a team.

From E. W., *Clinton, Mass.*—I have examined with much interest the barn-framing plans published in recent issue of *Carpentry and Building.* I would like to ask if there is really any need of all the lumber and work which are put into barns when built by these plans.

From E. M., *Decatur, Ill.*—My attention has been called to several sketches of barn framing published in the March number of *Carpentry and Building.* I inclose a draw- ing illustrating my style of framing. I have just built a barn of this character, which is very satisfactory indeed. I have been building in this way for some 15 years past.



From A. W. K.



From E. M.

Suggestions in Barn Framing, From Different Contributors.

An Appreciative Subscriber.

From S. E. L., *Topeka, Kan.*—I wish to thank you for the benefit I have derived from *Carpentry and Building.* If all my

investments brought as good returns proportionately as the amount of money put into this paper, I could, in a short time, discount Jay Gould.

Construction of Hollow Walls.

From F. B. H., *Franklin, Ind.*—In reply to the request of "F. D. R.," of Coburg, Ont., with reference to the construction of brick walls, published in the March number of *Carpentry and Building*, I would say that the best way of tieing the walls together will be to use brick instead of hoop iron. By running headers in 11-inch walls, just the same as they would be run in a 9-inch wall, he will accomplish the desired result. Any practical bricklayer can put in what is called a blind header. Your correspondent can have the ties constructed in this manner as close together as six courses between headers, and yet leave 1 or 2 inches between the headers for the passage of air. I think your correspondent will understand what I have said. I am a bricklayer, and the plan I have described is the method in use in this vicinity.

From L. W., *Claymount, Del.*—In reply to the question of "F. D. R.," in the March number of *Carpentry and Building*, I would advise him to dip his pieces of hoop iron in tar, which will prevent them from corroding. However, I do not like the idea of constructing a hollow wall for a building of the dimensions given by your correspondent. I have been engaged in building for several years, and for durability and the prevention of dampness I would recommend a 9 inch wall bonded every 10 courses, striped on the inside with 1 x 2 inch hemlock, lathing and plastering to this.

Support for a Barn Roof.

From W. B. R , *Jastings, Minn.*—I have just put in a support for a small barn roof, which, so far as I can learn, is new. The idea I obtained from a farmer's boy, a source of information not usual in such matters. The plan is particularly well adapted to small barns or horse stables, that are so common in villages. The barn in question, is 20 x 26 feet in plan. It measures 20 feet to the ridge and has 6-foot posts ; 2 x 4-inch studding are used, placed 24 inches between centers. They extend 6 inches above the second floor. The support consists of four 2 x 4-inch pieces, 18 feet long, running from the center of the ridge to the caps of the plates, in position like hip rafters, only placed on the under side of the rafters and spiked, and also spiked to the inside of the plates at the lower ends. This plan leaves the loft all clear for hay. Collar beams are dispensed with. Of course, the rafters may sag, if they are very light, but, in small buildings this is not noticeable. I would like opinions as of this method of construction. When the roof in question has been tested with a few feet of snow, I will report the result. I shall be glad to learn through *Carpentry and Building* if the idea is new to the readers of the paper.

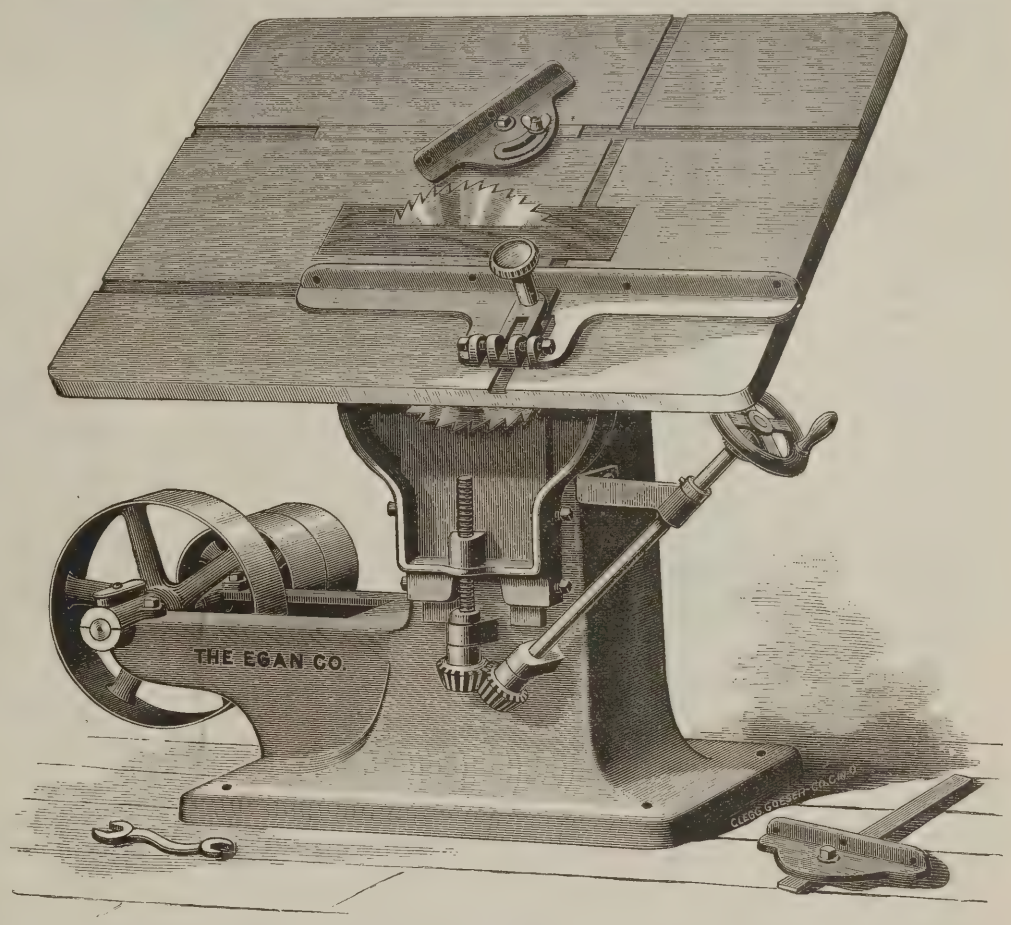
Hand Tool-Box.

From T. B. G., *Council Bluffs, Iowa.*—I would be greatly pleased if "S. T. B.," of Wellington, Ohio, would illustrate his tool-box in an early number of *Carpentry and Building*. I would like to have the subject further discussed by correspondents of the paper.

Novelties.

Improved Variety Saw.

We illustrate on this page, Fig. 1, a new variety saw with bevel table, built by the Egan Company, 221–241 W. Front street, Cincinnati, Ohio. The machine, being all iron and steel, the great variety of work it can be adapted to, and the precision and accuracy with which it can be handled, the convenience of adjustment, and the strength and durability of all its parts, stamp it as a standard machine for ripping, cross-cutting, beveling, cropping, grooving, mitering, &c. The machine is self-contained, the frame being a cored pedestal supporting the table carrying the counter-shaft. The table is of cast iron, well ribbed and braced, and can be set at right angles with the saw, or adjusted to any bevel up to 45°. The table is raised and lowered in planed, gibbed ways, with adjustment for wear. The mandrel is of best cast steel, and runs in self-oiling boxes. The fences can be used on either side of saw, giving the operator every advantage and convenience, especially when using the table on a bevel. This point will be appreciated by the practical sawyer. A 14-inch saw is generally furnished with the machine, and should run 3000. Furniture, Chair and bracket factories, planing mills, carpenters, pattern and wood shops of all kinds will probably find this a desirable addition to their machinery, and a quickly-adjusted saw for almost any purpose. The counter-shaft is on the main frame.



Novelties.—Fig 1.—Improved Variety Saw, Built by the Egan Company, Cincinnati, Ohio.

Gauge for Hanging Doors.

Reed & Auerbacher, 229 Bowery, New York, are introducing to the trade Plante's Gauge for hanging doors, a general view of which is afforded by Fig. 2 of the engravings. The gauge consists of an oblong block of wood provided on one face, at the ends, with surface plates to prevent wearing. Through this block are inserted accurate working gauge-rods, so adjusted and arranged as to provide in one tool all the necessary tools required in setting butts in hanging a door. Referring to the engraving, it will be seen that the blades A and B are contained in a single rod working cross-wise of the block. The point A works downwardly from the rod, while the point B extends in the opposite direction. The blade A is used for cutting the length and depth for insertion of the hinge on the door. When the blade A has been correctly set, the blade B is then in position for cutting the length and depth on the door jamb. In the construction of the tool in this particular there is an allowance of $\frac{1}{16}$ inch for required slackness between the door and the door-step. This allowance can be varied within certain limits by placing a strip of paper under the blade B when adjusting it. By this means the utmost nicety of fit can be obtained. The blade C is used for marking the depth on the door and the door casing.

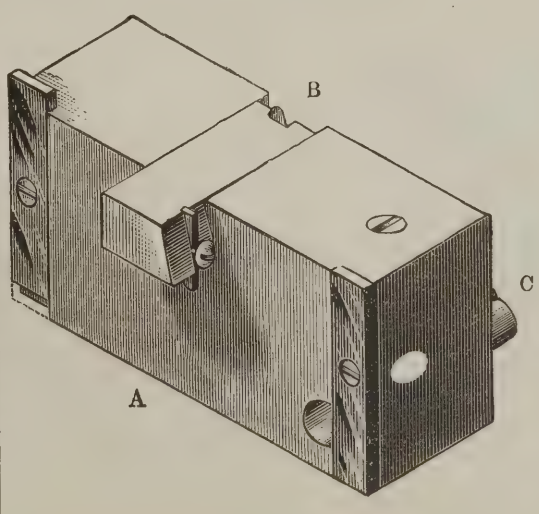
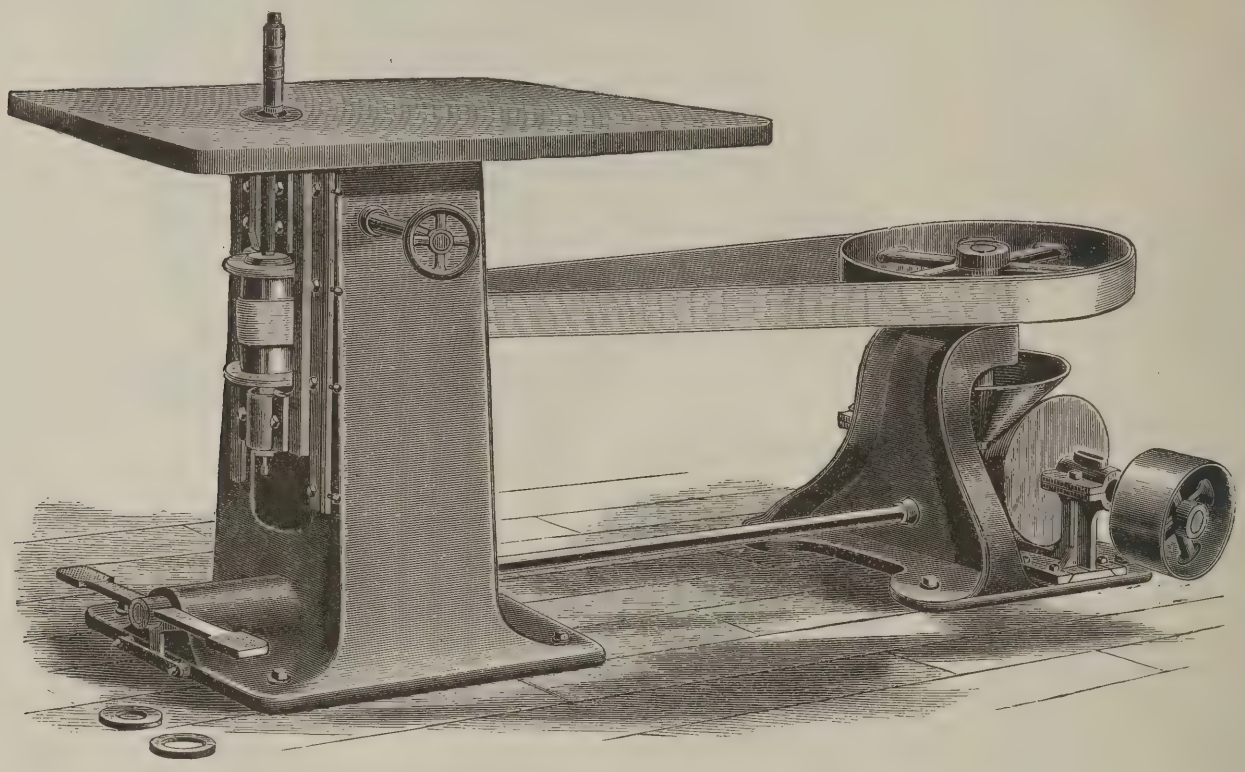


Fig. 2 —Plante's Gauge Block for Hanging Doors.

The inventor claims for this tool that it not only finishes the hanging of a door in a most excellent and workmanlike manner, but at the same time saves labor, enabling the workman to hang two doors in the time that is commonly required to hang one.

Single Spindle Friction Friezer.

Cordesman, Meyer & Co., 186–188 West Second street, Cincinnati, Ohio, are calling the attention of the trade to their Single Spindle Friction Friezer, a general idea of which will be gained by an inspection of the accompanying engraving, Fig. 3. The frame of the machine consists of a hollow iron column, cast in one piece, made very heavy, making vibration impossible, even when the machine is running at a very high rate of speed. The table is formed of strips of wood glued securely together, and is furnished with iron rings, allowing different sized cutters to be used. An iron table is supplied when desired. The spindle, which is of steel, is raised and lowered by the hand-wheel shown in the engraving. The part of frame supporting the boxes and spindle is gibbed to the main frame, so that all wear can be taken up. The firm direct special attention to their reverse attachment for reversing the spindle, which is operated instantaneously by treadle shown in the front of the machine. This treadle is self-locking, remaining where placed until a change is desired. The section of reverse frame carrying the horizontal shaft with driving cones, can be shifted on its base by the connecting-rod, in dove-tailed slide, fitted with gibbs, making a very solid bearing. The section of frame holding the upright shaft of reverse is very heavily made, as can be seen by the cut. The entire strain of the driving and reversing spindle is thrown on this shaft.



Novelties.—Fig. 3.—Single-Spindle Friezer, Built by Cordesman Meyer & Co., Cincinnati, Ohio.

Hook Door Spring and Door Check.

William Cunningham, No. 97 Chambers street, New York, is putting upon the market an article designated as a "Hook Door Spring and Circle Door Check," the operation of which is indicated in Fig. 4 of the engravings. The article is shown in place fastened against the top casing of the door. It is indicated by F in the engraving referred to. The spring extends into the opening of the door, and operates by the door coming against it and lifting it up, thus allowing the spring to retard the motion of the door by friction. The inward end of the spring is bent downward, thus making a hook that fits up into the rebate of the door frame. Among the advantages to which the maker directs attention may be mentioned that the check stops the slamming of the door, and also holds it closed without latch or catch. It is provided with an adjustment which adapts it for use with doors of different thickness. It is of a character not to easily break or get out of order, and it can be placed in position in a very short space of time.

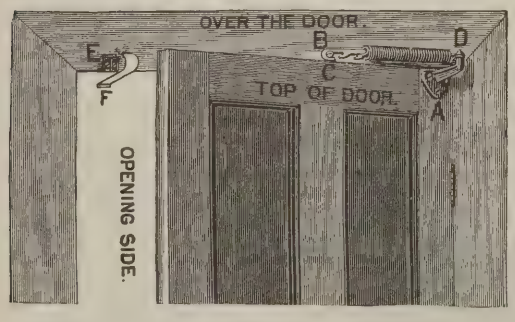


Fig. 4.—Barlow's Circle Door Check.

New Bench Drill.

E. C. Stearns & Co., Syracuse, N. Y., are putting upon the market a new bench drill, an illustration of which is presented in Fig. 5 of the engravings. It is useful to blacksmiths, wagonmakers, and all other mechanics who have any occasiou for doing light drilling. The device is of interest to the trade at large, because it combines the two most distinctive features required in such an article—namely, satisfactory working and cheapness. This machine has been before the public only a short time, but has already attained considerable popularity, as is evidenced by the fact that several thousands have been sold. The entirely new feature of this drill consists in the spindle being fed down quickly to the work by turning the crank. By reversing the motion of the crank the spindle is as quickly drawn from the work. The machine is 24 inches high, and drills ⅛-inch to ½ inch ished with standard size reamers, and throughout the parts are interchangeable. The crank has an extension for large drilling, and ample allowances have been made for strength and durability. This drill, as may be seen by the engraving, is of good design, and will look well in any shop.

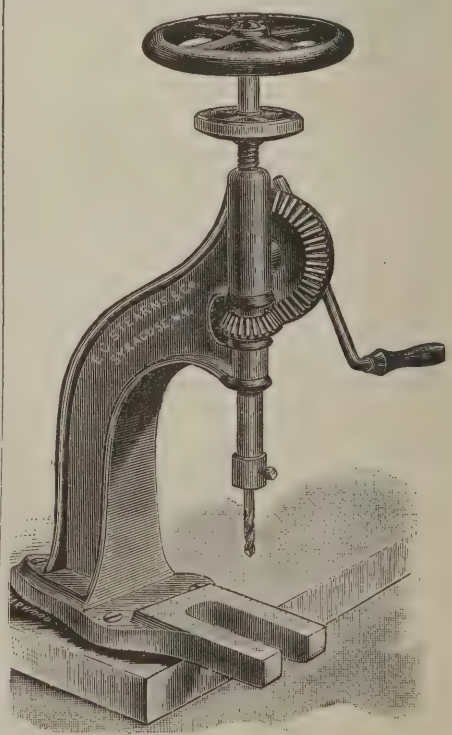


Fig. 5.—Stearns' New Bench Drill.

Improved Metal Spirit Level.

The Fitchburg Spirit Level Company, Fitchburg, Mass., are making a line of metal spirit levels, which are represented in Fig. 6 of the illustrations. It shows the style in which their 6, 8, 12, 18 and 24 inch levels with double plumb and side sights are made. It will be observed that the frame is of iron, attention being called to the fact that it is all of one piece, so that there are no parts to become loose, while, at the same time, simplicity and economy are secured. The manufacturers allude also to the glasses as being set in such a manner that they are immovable in case of accident or in general use, without the destruction of the entire frame, there being a surface of solid iron on each side and end. The glasses are placed in such a way that the setting of one acts as a support for the others, while at the same time the point is made that they are so far independent that one can be easily removed for the substitution of another without disturbing the rest. It may be added that there is an opening in the side of the frame through which the glasses are inserted, this opening being, however, so securely closed that it is practically concealed. The durability of this level is especially emphasized by the manufacturers, and the fact that it is not liable to be broken by even a much greater fall than would destroy other levels. Its accuracy and the moderate price at which it is offered are also emphasized.

Novelties.—Fig. 6.—Improved Metal Spirit Level.

Pedestal Jointer.

Goodell & Waters, 3101 Chestnut street, Philadelphia, Pa., are directing attention to a new pattern of jointer which they have recently made ready for the market. An illustration of this article is presented in Fig. 7. The weight of the machine is given as 1000 pounds. Speaking of it, the makers state that great care has been taken to arrange all the parts so as to be easily accessible, simple, durable and accurate. A special feature of this machine is the link motion for raising and lowering the tables. By the peculiar construction of the links, there is little or no chance for oil or grit to wear the working parts; the joints are all close and accurately fitted, so that it is almost impossible for any foreign matter to interfere. If properly lubricated the link motion may be relied upon as accurate and durable. When filing and setting the knives one of the tables may be raised up entirely free of the cutter head, leaving easy access for the operator to accomplish his work. There is, perhaps, no other wood-working machine which has been introduced to the public of late years which has come to be so generally used as the planer and jointer. In many cases such machines have superseded expensive articles like the Daniels or Dimension planers. No shop where rabbeting, chamfering, jointing, gaining, tapering, beveling or squaring up is done can afford to be without one. These machines are made in four sizes—to work 12, 16, 20 and 25 inches wide. The firm above-mentioned use the machine here shown in their pattern-making shop, and have put into this machine such features as their own experience has shown to be desirable.

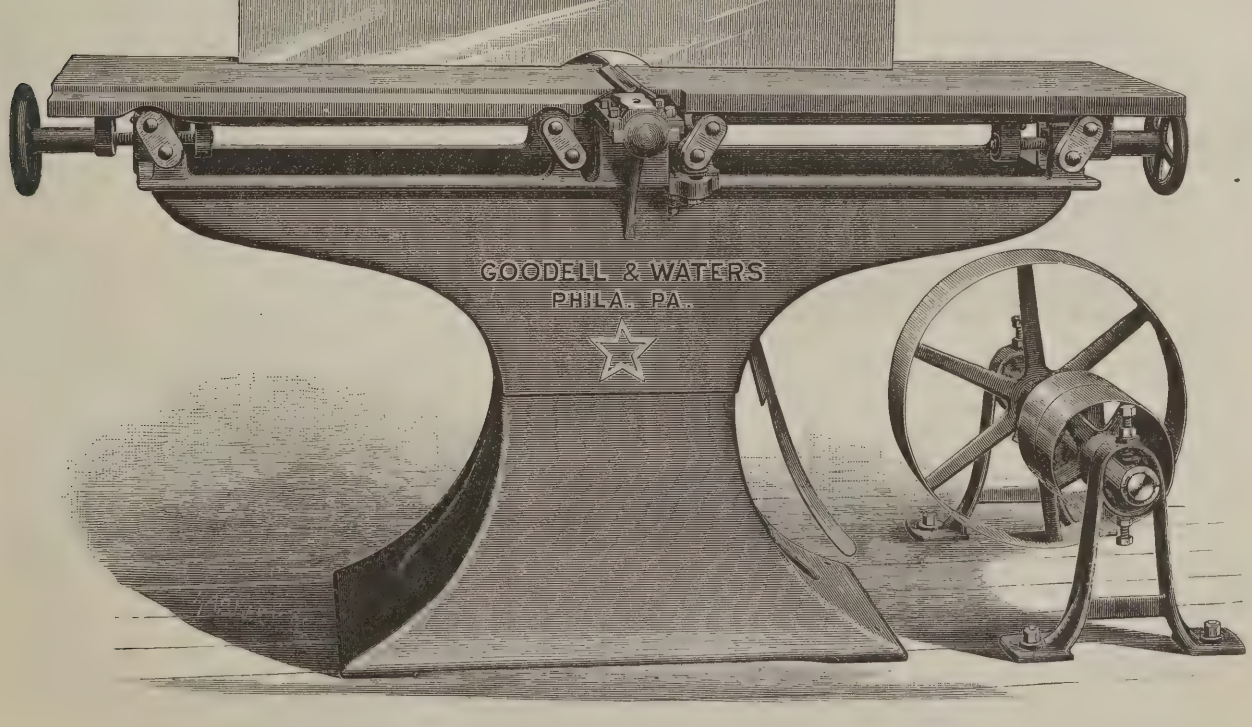


Fig. 7.—New Pedestal Jointer, Built by Goodell & Waters, Philadelphia, Pa.

Morrill's New Saw-Set.

Charles Morrill, inventor and manufacturer of Morrill's Perfect Saw-Set, an article with which our readers are familiar, is now putting upon the market a new tool differing in details of construction and principle from the one just referred to, and which has many peculiar advantages of its own. The strongest competitor of the new tool perhaps will be the saw-set mentioned above, and which has had a phenomenal sale. At the same time, Mr. Morrill is sanguine that the new tool is much better than the old one, and that, accordingly, it will in time also secure a host of friends. Fig. 8 illustrates the tool in a very satisfactory manner, and shows the way in which it is used. The parts of which the tool is composed are very few in number. By compressing the handles the stud carrying the dies, several sizes of which are furnished to suit different sized teeth, is drawn downward. The blade of the saw is placed upon a tipped leaf standing at the front of the stud, the tooth projecting under the die. The elevation of the leaf is varied at pleasure by means of the set-screw shown in the engraving. By this means any degree of set may be given that is desired. By choosing the proper die so much of the tooth may be bent as is required. The tipped leaf which furnishes the base on which the blade of the saw rests during the setting process is

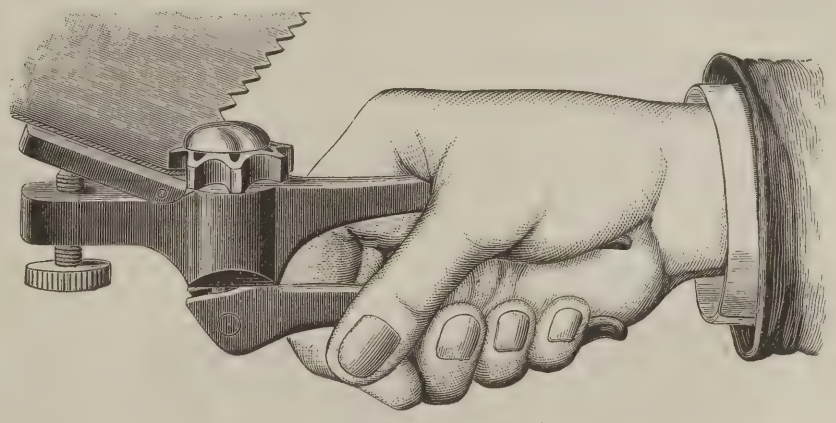
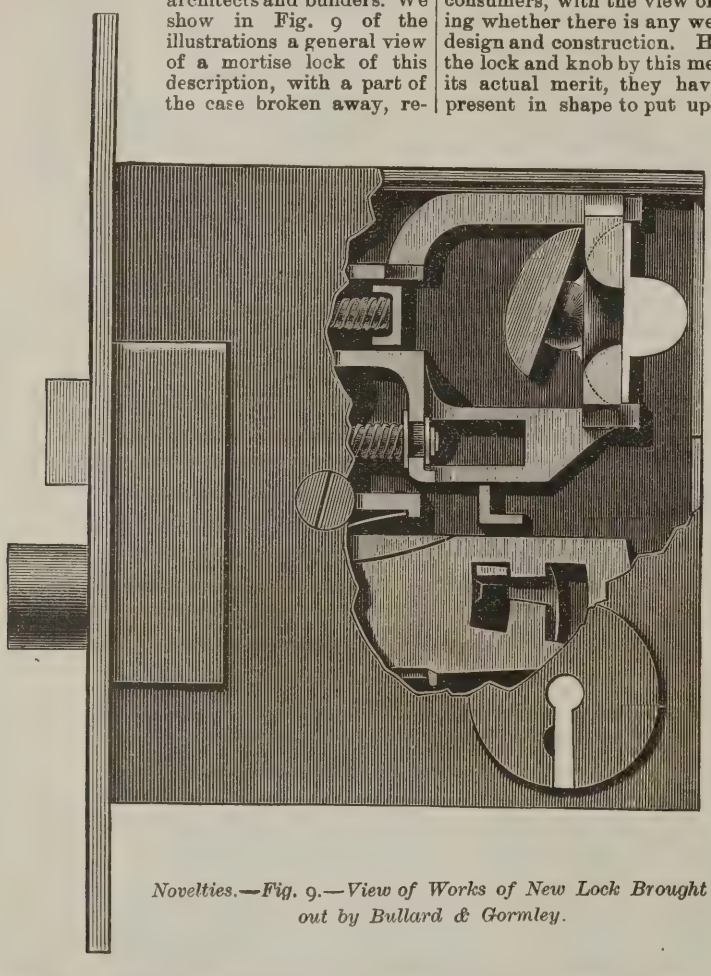


Fig. 8.—Morrill's New Saw-Set.

notched at the bottom, permitting the placing of a hard steel die underneath the teeth of the saw. The wearing parts are thus constituted of the best possible material for the purpose. By throwing the lower handle outward and forward the stud carrying the upper dies is raised, and also partially released from the spring which forces it upward, thus permitting the stud to be revolved, so as to bring any desired die to the front. A means of locking the stud is supplied, so as to secure accurate and positive work. Six different dies are provided. The relative size of the tool is clearly indicated in the engraving. The sample before us is neatly finished, and is of a character to recommend its use by mechanics in general. The inventor and manufacturer, speaking of this article, says that it is conspicuous for its simplicity. In setting a saw with it the most inexperienced person would find it impossible to make a mistake. Not only is it simple, but it is also strong, being made of the best quality of steel throughout. It is of such shape as to be conveniently carried in the pocket.

A New Lock and Knob.

Bullard & Gormley, of Chicago, are about to put upon the market a line of locks and knobs patented a short time since which possesses features of special interest to architects and builders. We show in Fig. 9 of the illustrations a general view of a mortise lock of this description, with a part of the case broken away, revealing the interior mechanism. Fig. 11 shows a knob or spindle, which indicates the peculiar principle upon which it operates. The construction of the lock is simple, being of the kind known as the "easy spring latch," with the hub left out. In its construction there is an elongated opening in the case, through which the knob shank is inserted. By sliding it horizontally forward it is securely fastened, and when the escutcheon is screwed to the door the knob shank is securely fastened to its place the same as if it was a part of the door itself. The second of our engravings shows a detail of the yoke, which is operated by the cam on the end of the knob shank. It will be seen that the bearing for the shank of the knob is conical in shape, and that the parts fit accurately together, thus overcoming all lost motion. The two knobs, when placed in position, bear against opposite sides of the piece represented in Fig. 10, and each has its own bearing in the yoke. Accordingly, each is turned independent of the other. The escutcheon used with these locks is of peculiar shape, and inside of the projecting boss, which surrounds the shank of the knob, ribs are cast which give the knob a long bearing which successfully resists rattling or looseness. No adjustment to the thickness of the door is required. The parts accommodate themselves, and the only difference in using two locks of the same kind on doors of different thickness would be the slight difference in space between the knob and the face of the escutcheon. These advantages will be appreciated by builders and mechanics in general. The lock, it will be noticed, is furnished with a round bolt. The makers direct attention to the fact that there is no lost motion in any of the parts of which this article is composed; that there are no loose spindles, screws or washers, and that the rattling and shaking so common to the old spindle knob is successfully overcome. The firm inform us that 100 dozen of these locks and knobs of the size and style we illustrate have been manufactured and put directly into the hands of consumers, with the view of thus determining whether there is any weak points in the design and construction. Having developed the lock and knob by this means, and proven its actual merit, they have their plan at present in shape to put upon the market a full line of styles and sizes. The article is one that will interest every builder and workman who takes delight in close working, neat door trimmings.



Novelties.—Fig. 9.—View of Works of New Lock Brought out by Bullard & Gormley.

Fig 10.—End of Latch Yoke.

Fig. 11.—Knob and Escutcheon Used With Bullard & Gormley's New Lock.

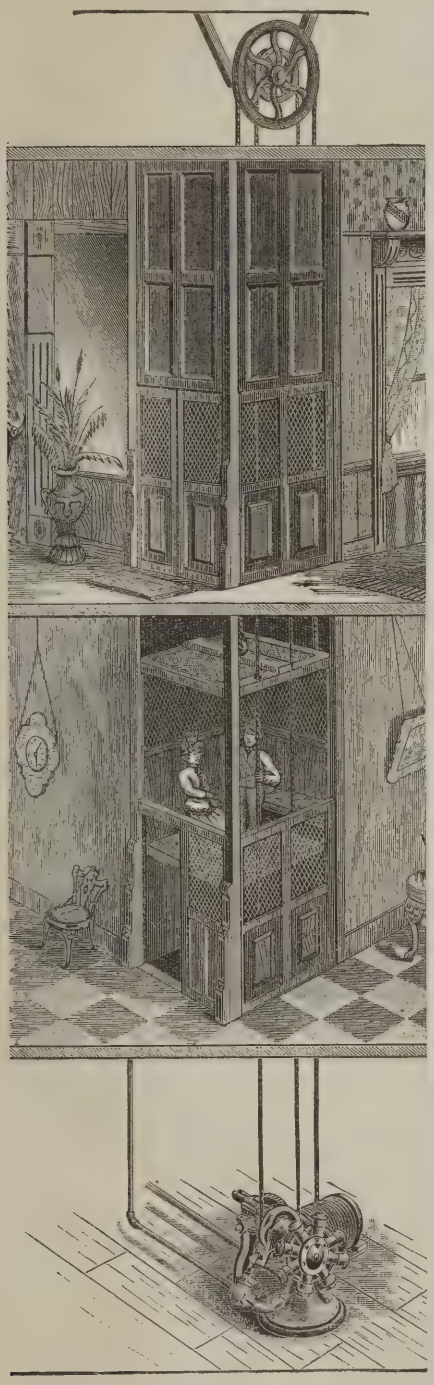
New Corrugated Conductor Pipe.

Many of our readers have been aware for some time past that Knisely & Miller, of Chicago, have been making preparations to put upon the market a corrugated conductor pipe which in many of its features has been intended to be superior to those which have preceded it. They inform us in a recent communication that they now have the leading sizes ready for the market, and that, accordingly, they are in position to solicit a share of the patronage of the trade. There is comparatively little in one corrugated conductor pipe that is different from other pipes of its class which can be shown by means of an engraving, particularly when made to small scale. However, we present a cut, Fig. 12, showing as well as we can the special features of the pipe in question. The makers direct attention to the fact that the corrugations are more evenly imparted; that they are of better depth, and that the pipe in its general contour is more nearly round than some other pipes with which it may be compared. The leading feature, after all, however, is that the pipe is in 8-foot lengths, of one solid piece, without cross seams. The machine on which this pipe is produced is very elaborate in character, and operates upon the plan of forming the pipe tihtgly over a mandrel, which extends through the entire length of the section during the time that the pipe is in process of making. Accordingly, each section as it is removed becomes an exact *fac-simile* of the mandrel, and is, in fact, an envelope stripped from it. The individual lengths of the pipe are slightly tapering, being enough smaller at one end to cause it to readily slip into the larger end of the next joint. In addition to this, each piece of pipe is provided at the large end with an expanded hub, as indicated in the engraving. This pipe is being made in various kinds of material, including galvanized iron, black iron regalvanized and tin plate regalvanized. The pipe will be made both round and square. Elbows, shoes, head and a general line of fastening are supplied.

Fig. 12.—New Corrugated Conductor Pipe.

Hydraulic Elevator.

The Amherst Hydraulic Motor Company, of Holyoke, Mass., are putting upon the market the elevator shown in Fig. 13 of the engravings. It is run by the Benham water motor, a description of which appeared in our columns some time since. The compactness of the motor is such that the manufacturers assure us that it can be placed in a much smaller space than any other elevator motor capable of raising the required load. They also refer to the fact that the motor is free from complicated



Novelties.—Fig. 13.—Amherst Hydraulic Elevator.

parts, and that accordingly it is very easily kept in order. Referring to the motor, a general idea of which can be gained from even the small representation of it shown below the representation of the elevator, it will be seen that it operates by means of eight pistons connected with the central crank-pin. Very short connecting rods are used, and these, with the crank and main journal, which runs on roller bearings, are inclosed in the space at the center of the cylinders. This is kept full of oil, so that all of the connections are constantly running in oil, constituting, as the makers point out, a durable as well as quiet running motor. The drum or hoist is driven by a worm and gear connected directly to the shaft of the motor. A reversible valve is used, thus making it possible to run the motor in either direction, and doing away with belts and tight and loose pulleys, which are commonly employed in such cases.

National Association of Builders.

The first meeting of the National Association of Builders assembled in Chicago, March 29, 30 and 31. We have not space for a full report, but the sentiment of the meeting and the more important measures considered, will be understood from the following:

The name adopted for the organization is the National Association of Builders of the United States. The objects of the organization are set forth in the following preamble:

"The fundamental objects of this association shall be to foster and protect the interests of contractors, manual workmen and all others concerned in the construction of buildings; to acquire, preserve and disseminate reliable information connected with the building trades; to devise and suggest plans for the preservation of mechanical skill through a more complete and practical apprenticeship system, and to establish uniformity of action throughout the country. The better to accomplish these objects, this association shall encourage the establishment of building exchanges in every city or town of importance throughout the country, and shall aid them to organize upon some general system that will not conflict with local customs and interests, in order that through these filial associations the resolutions and recommendations of this national association may be promulgated and adopted throughout the country."

The local building exchanges of all the cities and towns of the country were made eligible to membership, but only one exchange in any city or town would be received as members. The president, vice-president and secretary were made an executive committee to carry out the orders of the Board of Directors, and the latter body is to be composed of one delegate from each city or town, to be chosen by the annual national convention. The president is to appoint annually out of the Board of Directors a committee of three on legislation, to watch and report the legislative actions of the various States affecting the building trades, and another committee of three to gather statistics relating to these trades.

Mr. B. B. White, of Chicago, read a long but very able paper upon the necessity of a uniform system of drawing up contracts between builders, architects and owners, with a recommendation that a committee should be appointed to confer with the American Institute of Architects and the Western Association of Architects, and a resolution to that effect was referred to the Committee on Resolutions.

The report of the Committee on Resolutions embodied a declaration of principles, and was adopted in the following shape:

This association affirms that absolute personal independence of the individual to work or not work, to employ or not to employ is a fundamental principle which should never be questioned or assailed; that upon it depends the security of our whole social fabric and business prosperity, and that employers and workmen should be equally interested in its defense and preservation. While upholding this principle as an essential safeguard for all concerned, this association would appeal to employers in the building trades to recognize that there are many opportunities for good in associations of workmen, and while condemning and opposing improper action upon their part, they should aid and assist them in all just and honorable purposes. That while upon fundamental principles it would be useless to confer or arbitrate, there are still many points upon which conferences and arbitrations are perfectly right and proper, and that upon such points it is a manifest duty to take advantage of the opportunities afforded by associations to confer together to the end that strikes, lockouts and other disturbances may be prevented. When such conferences are entered into, care should be taken to state clearly in advance that this fundamental principle must be maintained, and that such conferences should only be competent to report results in the form of resolutions of recommendation to the individuals composing the various organizations participating, avoiding all forms of dictatorial authority.

That a uniform system of apprenticeship should be adopted by the various mechanical trades. That manual training schools should be established as a part of the public-school system, and that trade night schools should be organized by the various local trade organizations for the benefit and improvement of apprentices. This association earnestly recommends all its affiliated associations to secure as soon as possible the adoption of a system of payment by the hour for all labor performed, other than piece work or salary work, and to obtain the co-operation of associations of workmen in this just and equitable arrangement. That all blank forms of contracts for buildings should be uniform throughout the United States. That such forms of contract, with the conditions thereof, should be such as will give the builder, as well as the owner, the protection of his rights, such as justice demands. That whenever a proper form has been approved by this association, after consultation with the American Institute of Architects and the Western Association of Architects, we recommend its use by every builder and contractor.

The Legislatures of the various States should be petitioned to formulate and adopt uniform lien laws, and every organization represented in this association is recommended to use its best endeavors to secure the passage of the same. Architects and builders should be required to adopt more effectual safeguards in buildings in process of construction, so as to lessen the danger of injury to workmen and others by properly covering the entire surface of open floors with rough boarding. We recommend the adoption of a system of insurance against injuries by accident to workmen in the employ of builders, wherein the employee may participate in the payment of premiums to the benefit of his employees; also in securing the payment of annuities to workmen who may become permanently disabled through injuries received by accidents or infirmities of old age.

The next meeting will be held in Cincinnati, Ohio, on February 1, 1888. Officers of the association were elected as follows: President, J. Milton Blair, of Cincinnati; first vice-president, John S. Stevens, of Philadelphia; second vice-president, Edward E. Scribner, of St. Paul, Minn.; secretary, Wm. H. Sayward, of Boston; treasurer, John J. Tucker, of New York.

NEW PUBLICATIONS.

TALL CHIMNEY CONSTRUCTION.—By R. M. Bancroft and F. J. Bancroft. Size, 6¼ x 10 inches; 136 pages, with plates. Published by John Calvert, Manchester, and Farncombe & Co., Lewes, England.

Chimney construction is a subject in which every engineer is interested, and information pertaining to it is in great request. Among the more recent additions to its literature have been two papers read before English engineering societies, within the past few years, by Messrs. R. M. and F. J. Bancroft. The evident appreciation with which these papers were received led to further investigation and development of the material already on hand, with the ultimate result of putting before the public the highly interesting and valuable book of which we have a copy before us.

ARCHITECTURAL STUDIES.

Parts VI and VII of "Architectural Studies" have just been issued by W. T. Comstock. The first of these is devoted to small low-priced country houses, and contains among others a number of designs that can be executed for $1000 or less. Part VII is devoted to the interior of moderate cost houses, giving a large number of samples of window finish, wainscotings, staircases, hall and library finish, book shelves, mantels, &c.

TRADE NOTES.

WE HAVE RECEIVED from the Hanika Iron Fence Company, Springfield, Ohio, a copy of catalogue No. 22, illustrating the specialties manufactured by this company. A number of very handsome new designs of fences, gates, &c., are shown. Vases, lawn ornaments, settees and other similar work are included, and on the last page of the cover is a suggestion of jail and station house work which the company also manufacture.

A CIRCULAR issued by the Egan Company, Cincinnati, Ohio, is in the form of a poster printed in two colors, and containing illustrations to small scale, of a very large number of special machines which they manufacture. Each cut is provided with a caption naming the machine represented and briefly describing its features. The center of the poster is devoted to a perspective view of the works of the company, located at the corner of Front and Central avenues, Cincinnati, Ohio. Special value is given to the poster by rules for calculating the speed of pulleys, rules for measuring belting in the roll, directions for brazing band-saw blades, and directions for putting rubbers upon band-saw wheels.

WE HAVE RECEIVED from Frank L. Smith, 235 Washington street, Boston, Mass., a copy of a little work which he has recently put out, entitled "A Cosy Home and How It Was Built." The book is a small quarto, and has those features about it which commend it to the attention of all who are about to invest money in a house. A considerable number of designs, accompanied by floor plans are presented, many of which have already been erected. Planning and arranging are carefully discussed, and features of construction in several instances are presented. One set of cuts employed in this book is reprinted from our issue of February, 1886.

IN A RECENT ISSUE of the *Scientific American Supplement* Mr. C. Powell Karr, with whom our readers are acquainted on account of his interesting article on the subject of "Chimney Construction," presents a system of heating railway trains, profusely illustrated, with mathematical formulæ and details of different plans which are in use and have been suggested for use. The subject at the present time is attracting much attention throughout the country, and accordingly this article is very apropos.

PALLISER, PALLISER & CO., of New York, have issued a new edition of their building specifications. They also announce a new and important work in press, entitled "Palliser's New Cottage Homes"

A CIRCULAR was issued on April 1 by P J. McGuire, General Secretary of the Brotherhood of Carpenters and Joiners of America, with general office at Philadelphia, relating to the objects of the association, and bearing specially upon the benevolent features of the brotherhood. From this circular it appears that since 1883 the sum of $27,500 has been paid to widows and orphans and disabled members. The charter fee for a local union is $5. The initiation fee of members is $1, and the dues 25 cents per month. Each local organization manages its own funds.

WE HAVE RECEIVED from Charles A. Strelinger & Co., Detroit, Mich., a price list of builders' hardware belonging to catalogue No. 3 issued by this firm. Accompanying the price list is a single sheet circular devoted to Wollensak's patent transom-lifters and locks.

BERRY BROTHERS, of Detroit, Mich., with offices and warehouses in New York, Boston, Philadelphia, Chicago, Cincinnati, St. Louis and Rochester, are sending out a number of very interesting specimens of their work, illustrating Berry Brothers hard oil finish and the stains which they are selling. To architects and to the trade they are sending out an easel that displays 13 samples 3½ inches wide by 24 inches long. To painters, cabinet-makers and furniture men they are sending out specimens of felt suitable for use in rubbing down wood in the process of finishing. To carpenters and builders they are sending small panels of different woods finished, and also circulars containing bits of wood attached, showing the application of the stains which they are manufacturing. There is scarcely any one engaged in the building business, or who is contemplating building for himself, who will not be interested in some of the goods which this firm are sending out in the way of samples and advertisements.

C. H. POSTEL & CO., 1314 Ridge avenue, Philadelphia, are directing attention, in the way of references, to their work in ornamental glass, executed for the Union News Company, Pennsylvania Railroad Company, and for the Pennsylvania University. They offer to the trade designs and estimates upon application.

J. J. SPILKER, Cincinnati, Ohio, in directing attention to his universal miter box, points out that it differs from others in many important particulars, and that it is readily adjustable to any angle required by means of fences, which are movable, and the saw guide, which is tilting. It can be set to cut the depth of tenon, square or undercut.

THE HIGHLAND FOUNDRY COMPANY, of Boston and Chicago, are directing attention to the Highland and Peerless furnaces and ranges. They offer estimates to architects, builders and house owners, and furnish information with reference to heating questions to all applicants.

THE CORDESMAN MACHINE COMPANY, Nos. 43 to 47 Butler street, Cincinnati, are inviting the trade to write for prices and circulars of a general line of wood-working machinery. In their card, which appears in another part of this issue, several leading machines are illustrated.

ALFRED DOLGE, 122 East 13th street, New York, is directing attention to polishing felt, of the manufacture of which he makes a specialty.

J. A. FAY & CO., of Cincinnati, Ohio, lay before our readers illustrations of a number of their special wood-working machines, and also *fac similes* of some of the medals which they have secured in different competitions.

THE HARTMAN STEEL COMPANY, LIMITED, Beaver Falls, Pa., are directing attention to fencing, flooring, slating and roofing nails, and also to clinch nails and spikes of their manufacture. They are also extensive producers of steel-wire nails, and have branch houses for the sale of their goods in Boston, New York and Chicago.

H. J. SMITH AND JAMES MULLIGAN, operating under the style of the Keystone Stained Glass Works, No. 271 South Fifth street, Philadelphia, Pa., are directing attention to their art stained glass for churches, houses and public buildings. They offer designs and estimates upon application.

THE PIERCE, BUTLER & PIERCE MFG. COMPANY, Syracuse, N. Y., in directing attention to their Improved Florida Steam Heater, mention that 3500 boilers of this pattern are in actual use, and are giving satisfaction. They offer direct, or through their several agents, a list of which appears in their card in another column, estimates on any steam heating that may be required. Fourteen sizes of the apparatus are manufactured, and illustrated catalogues are supplied on application.

WE HAVE BEEN FAVORED with a copy of the speech delivered by Mr. Alfred Dolge, at the eighteenth annual reunion of his employees, at Dolgeville, N Y., in January last. The speech is in some measure a review of the doings of the year just ended, and also a consideration of some of the important social and economic questions which are at present agitating the public mind. Much excellent advice is given to his different employees, and all are urged to avoid the fallacies of the labor agitators and so manage their affairs as to make them useful citizens and to advance them in the general line of prosperity. We understand that Mr. Dolge has instituted a number of funds in connection with his business, which work as benefits to his employees. Those who have been with him for five consecutive years are entitled to a life insurance policy of $1,000, and at the expiration of 10 years of steady employment to another of like amount. A library is maintained, a pension fund has been established, and in various other particulars his employees are aided and stimulated.

THE CORTRIGHT METAL ROOFING COMPANY, of Philadelphia, are so arranging the machinery which they employ for the manufacture of their sheet-metal tile as to be able to furnish tile of the construction peculiar to their system, with any design embossed upon the surface that an architect may require. The extra charge for special patterns of this kind will be very slight. This affords the opportunity of using monograms upon railway buildings and devices appropriate to the use of a building, and upon clubhouses, &c. They announce that architects' special designs will be made and kept for their exclusive use in copper or tin plate.

EDWIN A. JACKSON & BRO. have recently removed from their old location on Beekman street, New York, to a new office almost opposite. The new premises have been very handsomely fitted up, and the firm are in excellent shape to display their goods to callers.

W. T. COMSTOCK, the well-known publisher and dealer in architectural books, has removed from 4 Astor Place to No. 23 Warren street, New York. This change in location brings Mr. Comstock more nearly to the printing, engraving and lithographing trades of the city, and is a matter of great convenience in the conduct of his large and rapidly growing business.

ACCORDING TO THE ENGRAVINGS of the new Auditorium Building in Chicago, which have appeared in some of the daily papers, this structure, architecturally speaking, is going to be as handsome as a slaughter-house with a big chimney near one end. Perhaps, however, we do the building great injustice to criticise it from such poor prints as the daily papers ordinarily lay before their readers.

PERHAPS ONE of the most interesting wood-working machines that is in use is that which produces the wooden toothpicks, which are a personal necessity, at the present time, the world over. A machine of this kind is the invention of E. F. Edgecomb, of Mechanics Falls, Me. Mr. Edgecomb was drawn into the toothpick business by accident. He contracted to build some machinery which was not taken off his hands, and therefore, to save himself, he arranged to utilize the machinery by putting it into operation. Being outside of what is known as the "Tooth Pick Pool," he was thrown upon his own resources and, as the result, brought out a machine, the principle of which is entirely new, and which, it is said, produces the picks five times as fast as any machine previously invented. It is said that the new machine, now in successful operation, makes 10,000 picks per minute. Eight people in the little shop, in which the machine is employed, produce 2,500,000 toothpicks a day. Green berch and poplar wood are used in making the picks.

A DOOR PANEL made of sheet metal has recently been patented by Levi S. Enos, of Andover, N. Y. The invention consists in securing between the side and end pieces of the door a longitudinal corrugated sheet of thin iron, forming a single large panel covering almost the entire surface of the door. The straight edges of the corrugated sheets are let into grooves in the vertical portion of the frame, while the ends abut flush against the inner edges of the end pieces of the frame.

A FEATURE of building construction at the present time is the extensive employment of enameled brick. These are used in places exposed to moisture or where contaminating vapors are present in the air. The great superiority of such brick to painted brickwork in kitchens, laundries, courts, cellar areaways, &c., are becoming recognized. They are also very desirable for use in different places for wainscoting, as well as for ornamental fronts.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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VOLUME IX. NEW YORK, JUNE, 1887. NUMBER 6

NOTES AND COMMENTS.

THE Chicago builders are the latest acquisition to the list of employers organized to resist the encroachments of organized workingmen. Operating through the Builders' and Traders' Exchange, they have effected an organization of the building interests of Chicago, including not only those engaged in the actual work of erecting and finishing houses, but also those dealing in materials. The originators of the scheme say that it is not their purpose to build up the organization for the sake of crushing labor, but to enable a long-suffering class of employers to defend themselves and to resist the increasing attempts of workingmen to manage every detail of their business. The strength of the new organization is undergoing a very severe test in the labor disturbances which, as we write, are paralyzing the building industry of Chicago. The cause of this latest trouble was the rule that has been followed for some years to pay off bricklayers and stonemasons on Monday or Tuesday. This has seemed most satisfactory for a number of reasons, one of which is to secure the regular appearance of the men at their work on Monday morning. This change has, however, never been accepted willingly by the men, and latterly they concluded to strike if pay day was not changed back again. They believed themselves strong enough to force this concession, as they had obtained nearly everything else they had asked for. But they reckoned without their host. The carpenters' strike, the hod-carriers' strike and a number of other strikes of less consequence had gradually worked the employers up to a fighting pitch, and this last strike was the straw that broke the camel's back. On May 12, after a number of bricklayers and masons had quit work, the builders' association ordered all building operations to be discontinued on Friday evening, May 13, and to remain so until the labor trouble was settled.

WITH the exception of a few buildings and other construction work which had to be pushed or great loss would result to the contractor, all work of this character in Chicago was suspended on May 13th. Not only was it impossible to get a builder to agree to do any work, but it was equally impossible to purchase any material and have journeymen undertake the work without the intervention of a builder. At the lowest estimate over 20,000 men were thrown idle, to remain so until the workingmen agreed to free the builders from the restrictions which have been forced upon them from time to time for years. It is reported that the builders will insist on the non-recognition of unions, the re-establishment of the 10-hour day, the opening of Chicago to workingmen from any other locality, and the gradation of pay according to the ability of the men. The brick-yards, with very few exceptions, also closed down May 18, throwing out of employment over 7000 men. It appears that the brick manufacturers have grievances of their own which they want to redress, and especially do they object to having the production of their machines regulated by the dictation of the unions. Trouble is also reported in several brick-yards in the East, where the men, dissatisfied from one cause or another, have sought to gain their desired end by the expensive method of striking.

INDUSTRIAL towns on the plan of Pullman, near Chicago, seem to be getting popular. A few weeks ago the announcement was made that Jay Gould proposes to found such a town near St. Louis. Now it is said that the Atchison, Topeka and Santa Fé Railroad Company will build another Pullman about 11 miles west of Kansas City. Large manufacturing establishments will be located there, surrounding which will be a miniature city, with all the conveniences and advantages of modern life. Another scheme of the same sort is reported to be under way near Lincoln, Neb., promoted by the Chicago, Burlington and Northern Railway Company. A desire to avoid the troubles usually connected with strikes may be, and very probably is, a strong incentive to the establishment of such towns, in which everything will be owned and controlled by a single corporation. While it is the object of guarding the interests of workingmen more carefully under such circumstances, and increasing their comfort and even pleasure, it is hoped to render them less liable to become the prey of discontent and to reduce the danger of their striking. At the same time, the corporation would possess formidable power in such an emergency. From the employers' standpoint such reasoning may seem sound, if it were not for the fact that the most intelligent and most desirable workingmen are likely to resent such an effort.

IN ONE of the daily papers there is published a letter written from Guadalajara, Mexico, which presents an idea of life in that country that is not without interest to those who deal in stoves and other forms of cooking and heating apparatus in this country. After referring to the view that is presented to the observer who climbs to the top of the Cathedral tower in the city named, the writer says: "One thing that will probably strike him with surprise, if new to Mexican cities, is the absence of chimneys, which in other countries form so prominent a feature of such views. In all this sunny country there is no such thing as a stove or fireplace, hence no chimneys. In Jalisco the temperature remains at about 70° from year to year, and though the traveler will feel inclined to keep in the shade at noonday, he should wear flannel undercloth-ing constantly and a light overcoat in the evening. The cooking is all done with charcoal in Dutch ovens built out of doors, or in earthen pots similar to our large-sized plant jars, partly filled with coals, upon which smaller jars are placed. Chimneys would be a superfluity, for nobody wants a fire in the house with the thermometer never below the seventies, and for the same reason he objects to inclosing himself in a conservatory by putting glass in his windows when all the winds of Heaven are welcome. But, though he should want it never so badly, fuel enough to run one of our wasteful cooking machines would be entirely out of the question, since coal—which is mostly imported from England—costs $25 per ton and wood $20 per cord. Gasoline is unobtainable, and petroleum sells for $1.25 per gallon."

ONE of the suostances which has been employed recently with much reported success, as a non conductor of heat, is the artificially prepared basic carbonate of magnesia, or "block magnesia" of commerce, concerning which we find some interesting information in a paper read by Mr. E. Luttgen, at the recent Scranton meeting of the American Institute of Mining Engineers. The compound, we are told, is molded to form coverings suitable for steam pipes and their fittings, and sectional jackets for boilers and cylinders. It is furnished, also, in forms suitable for lining refrigerators, walls, and roofs of buildings, fire-proof safes, &c. Without attempting to note, even superficially, all the details which Mr. Luttgen gives of the physical qualities of this non-conductor, we will devote our attention mainly to the results of the tests which he made to determine its efficiency as compared with the various non-conducting materials already on the market. The apparatus used by Mr. Luttgen consisted essentially of an inclined 2-inch pipe 6 feet in length, closed at its lower end by a cap connected with a stop-cock. By means of this the water of condensation could be drawn off and measured. The pipe was covered throughout its length with the material to be tested, and steam was admitted to it from the boilers through a steam-pipe well wrapped with a covering of hair felt. The various fittings were protected in the same manner, so that the steam entering the test-pipe was as dry as possible. For each covering under trial a separate test-pipe was used. Eight samples of material were tested, the average steam pressure being 70 pounds per square inch.

FROM these experiments it was found that of the materials tried the hair-felt covering was the most non-conducting. The magnesia covering ranked next, and close upon it came mineral wool. Following this came three kinds of paper coverings, and finally fossil meal. One carbonate of magnesia sample consisted of hollow cylinders of the magnesia compound, 3 feet long and bisected longitudinally. The two halves were held together by a jacket of asbestos paper. A second sample was the same as the first, but had a jacket of cotton duck or light canvas instead of the asbestos paper jacket. The slight difference of radiation between the two was more probably due to an accident in the manufacture than to the difference in the jacketing material. Compared with the figures for condensation with a naked 2-inch pipe carrying 60 pounds

pressure, a good covering, as, for example, magnesium carbonate, showed a saving of somewhat over 3 pounds of steam per day of 10 hours for each foot of pipe covered. What this will amount to with an actual plant can be shown by a very simple calculation, and with one of even small dimensions will be found to represent an important item of cost.

IN deducing the results no allowance was made for condensation by the caps at the lower ends of the test-pipes, but, as they were well wrapped with cotton wool and represented but a small portion of the whole surface, their influence, it was thought, could be disregarded. The extent to which it would have modified the figures, if taken into account, would certainly have been very slight. While these trials have brought magnesium carbonate to favorable notice as a non-conductor of heat, their chief interest undoubtedly lies in the fact that they have added further to the existing information of non-conducting materials generally. With the exception of a series of valuable experiments on the subject conducted within the past few years by Prof. John M. Ordway, of Boston, for the Boston Manufacturers' Mutual Fire Insurance Company, very little has been done in this line of investigation, and every new acquisition is accordingly welcome.

THE establishment of a parcel post between the United States, the West Indian Islands, Central and South America is in contemplation by the Postmaster-General, and overtures to this end have already been submitted to the authorities in Jamaica. The proposition is that, in addition to the bona fide trade patterns and samples of merchandise, the transmission of which is specially provided for in the Postal Union Convention, there shall be admitted packages of merchandise of every description, without regard to the saleable value of the contents or to their liability to customs duties in the country of destination, provided they do not exceed four pounds in weight. It is further stipulated that said packages shall be subject, in the country of destination, to all of the customs regulations in force in that country for the protection of its customs revenues and to the rates of postage in the country of origin, which shall be required to be fully prepaid, thus securing the delivery of such packages to addresses without additional charge for postage.

THE mansion of M. Spitzer in the Rue Villejust, Paris, contains a most notable collection of masterpieces in works of art. A visitor describes wonderful ironwork found in one of the spacious apartments as follows: "Here are locks and keys of wrought iron, chased, damascened, and otherwise worked as if the material were as soft as ivory. One wrought-iron lock represents Adam and Eve standing on each side of the tree of knowledge, around whose trunk is wound the serpent. The figures are in high relief; the tree with its branches stands out in the round from the tracery background of the lock, and seek as they will the modern smiths cannot discover the secret of its fabrication. Another iron lock has three compartments in the form of a triptych, and on a background of Gothic open-work trocery are figures in high relief and almost in the round. In the middle compartment at the top is God, and at each side an angel; below is Christ and the Virgin Mary, and below them are souls climbing up to heaven or being flung down to hell by attendant devils. In the compartment on the left, Peter, carrying his key, and, aided by two debonnaire angels, is letting souls into Paradise, patting the timid on the head encouragingly. In the right-hand compartment we see hell fire, and quaint devils with long tails prodding unhappy souls and pushing them down into the sea of burning brimstone. On this lock there are nearly 40 figures, each about 2 inches high, and most delicately wrought. The lock is about 9 inches high, each of the side compartments 4 inches broad, and the central panel 6 inches broad. The value of such a piece of work as this cannot be estimated."

THE improved Stock Exchange building in New York City has a trading-room containing 13,400 square feet, nearly double its former capacity, surrounded on all sides by a deep gallery. Its walls extend to the roof of the building, which is crowned by an immense dome shaped skylight of cathedral glass, through which the light is admitted to the room. The main entrance will be located upon the Broad street side, the outer door opening into a vestibule handsomely frescoed and tiled in marble. Over this vestibule and extending upward to the roof are four tiers of offices, reached by an elevator from the trading-room door. On the first floor, the entire space will be utilized as a "Board Room," where also the sessions of the Governing Committee will be held. The arrangement of this room will be somewhat on the Senate Chamber plan, with its massive seats ranged in a semicircle about the rostrum platform, which will be flanked by a large bay window overlooking and slightly overjutting the floor of the trading-room. The second floor will be set apart for the offices of President and Secretary, and will contain specially constructed fireproof cabinets for the thorough protection of the records of the Exchange. The third floor will be occupied by the Exchange library and committee, smoking and chess rooms. The fourth, or top floor, will be applied to the exclusive use of messengers and other employees, and will be thoroughly equipped with lockers and lavatory conveniences. The total improvement will cost in the immediate neighborhood of $200,000. When completed this building will be among the finest in the country.

THE PLATES.

In Plate XXI we show the perspective view of a house designed some time since by John F. Stanton, of Manchester, N. H. The floor plans and details are also contained in this issue. Concerning this building, Mr. Stanton writes us that the house was put up at Concord, N. H., by Messrs. Head & Dowst, of Manchester. The cost was $1285. The building as erected was provided with a cellar extending under the entire structure, and the foundations were of stone in their lower part and brick in the upper part. The framing of the house was of hemlock, and the inside finish was well made of clear pine stock, and painted two coats. The newel, handrail and balusters were of cherry. The plastering was of two-coat work. The chimneys were topped out out in colored mortar and dressed down. The outside painting, as well as inside was of two-coat work.

In our double plate page this month, we show the design and details accompanying Mr. C. Powell Karr's article on rough cast, which appears in another column. This subject is of more than passing interest to a large number of the readers of this journal, and his presentation of it is in a form to be of great usefulness.

A new volume relating to designs for the patterns of textile fabrics, for the ornamentation of manufactures in wood, metal, pottery, etc., and also for the decoration of walls, ceilings and other flat surfaces, bearing the general title of "Modern Ornamentation," has recently been put forth by Christopher Dresser, a well-known author. The design in Plate XXIV is reproduced from this work. It is slightly reduced from the size of the original, and is here printed in a different color from that employed in the original work. The plate is printed in the book in what may be described as a rich red tint. In the estimation of the critics, who have reviewed this work, the term "Modern Ornamentation" is somewhat too comprehensive a title to be given to a collection of 50 plates. The plates, they say, may be regarded as an abstract idea in ornamentation, not designed for any special place, process or material; but simply as ornamentations which may be adapted to a certain purpose, or which may furnish starting points and suggestions to be developed by workers in their own way. The plate which we present is, perhaps, as fair a sample of the character of the work as any that we could lay before our readers.

Influence of Material on Design.

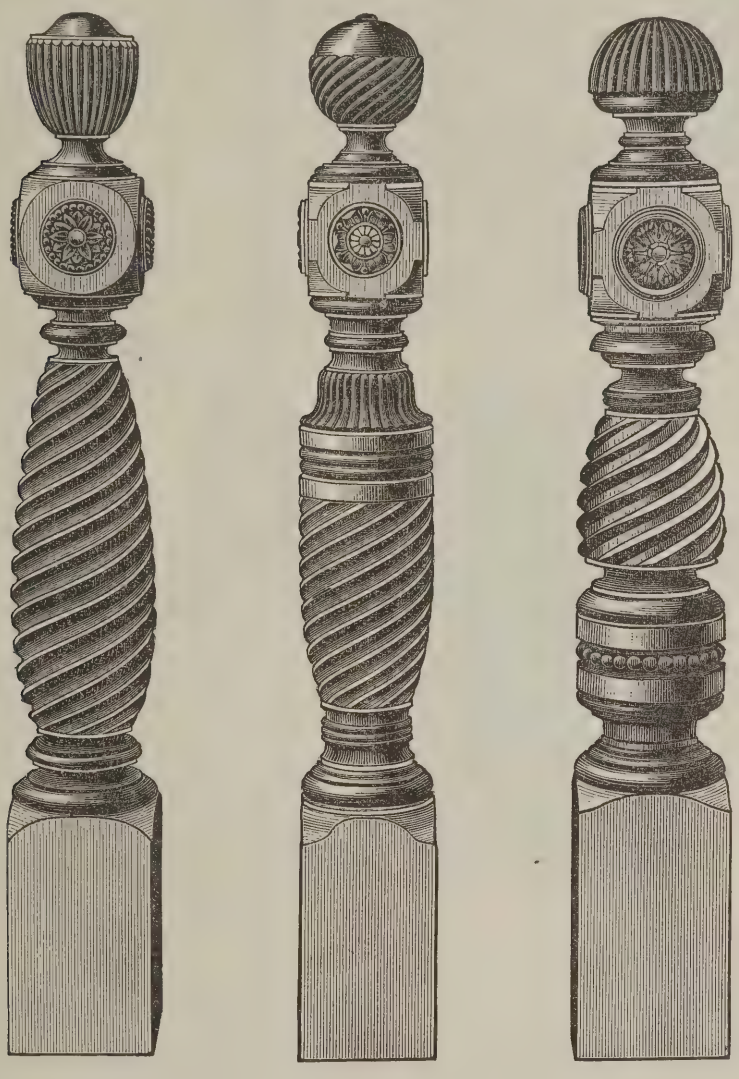
F. Fowke, in discussing the influence of material upon design, writes as follows:

The nature of the building materials in common use in different parts of the world has always exercised an important influence over the character and nature of the constructions of which they form a part, so much so as, in fact, to influence in a great degree the system and feeling of national architecture, so that we have the ponderous massiveness of Egypt, the stern grandeur of Greece, and the classic elegance of Rome—all the offspring of a hard, enduring material, more or less stubborn under the chisel and mallet. The more manageable materials in use in the middle ages, were undoubtedly instrumental in producing a change in the nature of the constructions of the period, and probably to such accidents of place and circumstance are we indebted for many of those beautiful and fantastic forms which delight us as much by their delicacy of execution as by their hardihood of design, and in which the architect, adapting his work to the materials at his disposal, has atoned for his departure from the severe outline and imposing masses of Classic architecture by the introduction of a charm to which his sterner predecessors were strangers. In our own time, in newly settled countries, such as America, and many of our colonies where wood is abundant, and stone is either difficult to obtain or expensive from the scarcity of labor, we find a different kind of construction springing up, often picturesque in appearance, and exhibiting much talent in design, but especially creditable for its simplicity and ready adaptations; at the same time, its ephemeral and temporary character cannot fail to give it more or less an air of insecurity and want of strength, however unmerited. Finally, we come to that period which has with truth been called the age of iron, in which a total change of material has effected as great an alteration in the construction into which it enters, rendering simple feats of construction, which it would have been folly to have attempted in any of the previous records.

The value of paint-skins as a roof-cement is alluded to by a correspondent of an exchange. Allusion is also made to refuse paints in which the oil is very thick. The writer says: "At the paint-mills it is their custom to grind all of the leavings and scrapings into one mass. This, as far as I know, goes by the name of 'brown paint.' It is a dirty brown, because all colors when mixed together produce this color, which is about no color at all. While this composition is not much for good looks, it is very cheap, on account of the limited demand for it, and, as it is composed of every kind of paint mixed together, it makes the best roof-cement I know of. This cement can be bought at any paint-mill."

Spiral Balusters and Newels.

The demand that has recently sprung up for designs of newels, balusters and similar work, in which the spiral idea is more or less predominant, is one of the notable features of the times. Every catalogue nowadays contains more or less work of this kind, and numerous are the machines which have been constructed for its manufacture. Hand carving in this form is extensively used. The designs presented on this page are from the catalogue put out a short time since by Messrs. Anderson & Dickey, No. 41 Bristol street, Boston, Mass. We learn from the makers' catalogue that the work is glued up of the very best seasoned stock and that the rosettes shown in the newels are hand carved. The catalogue which this firm have issued contains a large assortment of turned balusters, spiral and fluted balusters, fancy spiral balusters, turned and twisted solid newels and other similar work.



Turned and Twisted Newel Posts, Manufactured by Anderson & Dickey, Boston, Mass

NEW PUBLICATIONS.

WOOD-TURNER'S HANDY BOOK.—5 x 7 inches, 150 pages; bound in cloth with 104 illustrations, by Paul N. Hasluck, London, Crosby, Lockwood & Co.

This little volume forms the second of a series which was announced some time since under the general name of "Handy Books for Handicrafts." It is intended as a practical manual for workers at the lathe, and embraces information about the tools, appliances and processes employed in wood turning. Mr. Hasluck possesses eminent qualifications for the task upon which he is engaged, and he is already known to a large class of mechanical readers, both upon this side of the water and the other, by reason of his volumes, entitled, "Lathe Work," "Metal Turner's Handy Book" and others, and his contributions to periodicals devoted to the mechanical trades. The lathe, which is claimed to be the creator of mechanism, is a machine in which all mechanics should be interested. The knowledge of the art of turning finds useful application in all the mechanical arts; and not only is a large portion of the community employed in this work, but many enter upon its practice as affording pleasurable and profitable recreation. Turnery employs many workmen and has special claims on amateurs. The contents of the book are embraced in 13 chapters, leading the learner from simple work with simple machines, to the most complex work and the finest mechanism that is employed for the purpose.

LEVELLING AND ITS GENERAL APPLICATION. By Thomas Holloway. Size, 9 x 5½ inches; 143 pages. Published by E. & F. N. Spon. 1887.

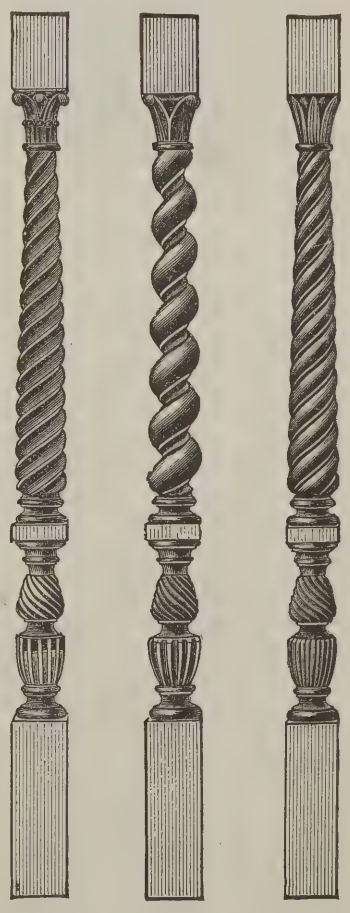
The book before us is not an advanced treatise on the art of leveling such as the well-practised surveyor would wish to consult for further instruction in the difficult problems of his work, but is a book, as the author states, written solely for the uninitiated. It takes up the subject at the very rudiments, defining the simple terms and illustrating and describing the instruments in common use. Some very sound advice is given to the intending purchaser of levels, the author warning such against buying low-priced or imperfect instruments. The bother occasioned by the use of poor instruments in work of this nature, which requires accuracy above all things, is almost incalculable, and while it is without doubt excellent training to adjust and use levels and other swinging instruments which are worn out or badly constructed, the beginner would do well to get good instruments to begin with. In the adjustment and use of simple leveling instruments the book is very explicit, and the instruction comprehends all the little details which otherwise are so difficult to master. By the aid of numerous diagrams and illustrations the use of the leveling instruments is rendered clear, practical examples assisting very materially in the explanation of the subject. Toward the end of the book more difficult problems are treated of, and reference is made to the theodolite, clinometer, aneroid barometer and other useful instruments more or less associated with leveling. The subject matter of the book is divided into 15 chapters, besides which there is a very complete alphabetical index. To those desiring to learn the principles of leveling, and the simple application of the art, this book will supply the information,

Characteristics of a Good Floor.

One of our contemporaries in specifying the features of a good floor arranges the specification in the following form:

A good floor should be
A test of the builder's skill;
Of thoroughly seasoned lumber;
Without creaking boards;
Without splintering edges;
Without gaping joints;
Without curling section;
Flat as a table-top;
Rigid and smooth;
Almost imperceptibly jointed;
Undisturbed when laid;
Laid on straight-edged joists;
Without heading joints;
Laid without showing nails;
Of edge-nailed boards;
Laid on a bed-floor.
A good floor is a rarity.

The Supreme Court of Vermont has announced its decision in the famous case of the Ryegote stonecutters' conspiracy, growing out of the attempt of the workmen to prevent the employment of other workmen,



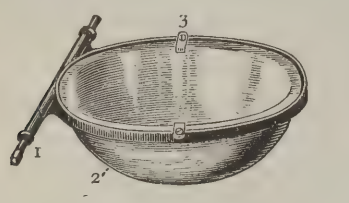
Fancy Carved Cap Balusters.

and to deter them from working by denouncing them as "scabs," and threatening to make them publicly odious as such. The decision of the Supreme Court is that a conspiracy among workmen to prevent others from working or from being hired is a crime at common law, and punishable under the statutes of Vermont.

PLUMBING SPECIALTIES.

The Connolly Water-Closet.

A pan water-closet, but one which is said to be entirely free from the defects ordinarily accompanying this type of closet, is being put on the market by the Connolly Mfg. Company, 351 Adams street, Brooklyn, N. Y. The Connolly closet embodies a number of improvements which will be understood by reference to the accompanying cuts. The first claim put forth by the manufacturers is that it is a sanitary closet, and as many maintain that pan closets of whatever construction do not possess this important feature it is but just to summarize their reasons in support of this claim. It is stated that the pan closet when supplied with water from a tank never became foul, and that it was only when they were supplied from direct pressure through a



The Connolly Water-Closet.—Fig. 1.—General View of Glass Pan.

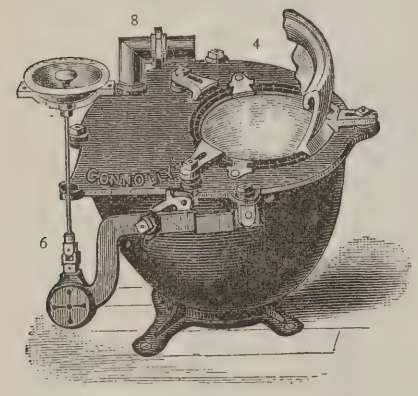


Fig. 2.—View Showing Construction of Closet.

⅝ or ¾ inch supply-pipe that gave an insufficient quantity of water that the trouble began. The copper pan of the old closet is also described as an objectionable feature, and, further, the constant effort to reduce the cost of manufacture so as to meet competition has resulted in making the present pan closet a very poorly constructed device. In the Connolly closet it is claimed that all these defects are remedied and a number of improvements introduced. Fig. 3 shows the Connolly closet with round supply cistern above it. The shape of the cistern is referred to as being neat in appearance and taking up but little room, besides giving a greater depth of water than the ordinary square cistern. The closet pan, made of glass, is shown in Fig. 1. It consists of a brass ring and shaft cast in one piece, and so constructed that the flange of the ring will fit a corresponding flange of the glass pan which is held securely in place by brass plates and screws (3) on each side, thus dispensing with the use of solder. The pan does not come in contact with the top of the closet, it being so constructed that the brass ring strikes the top. Should repairs become necessary the pan can be easily taken out and replaced without disturbing the ring or axle or using solder, by simply unloosening the screws and removing the small brass plates on top of the closet as shown at 4, Fig. 2. The closet bowl (see Fig. 2) is held in place by three brass clamps and bolts, thereby preventing the joint from breaking when water is suddenly poured in. The pull is fitted with a swivel joint (6), which prevents binding in case the seat is out of true. There is a slot on the weight of lever which locks the nut on connecting bolt of pull and prevents it from working loose. Another feature referred to is that the closet can, if desired, be vented by the pipe shown at 8, Fig. 2. The bowl, of the flush rim style, is oval in shape and has the hole set well back, which lessens the liability of it becoming soiled. The bowl is supplied with water through a 1¼-inch connection. The large size of the pipe is a feature to which special attention is called, as it provides for an ample flush. The supply-pipe is connected to the bowl by means of a brass coupling, which gives a strong and tight joint. An improved arrangement for connecting cistern-valve to water-closet by chain and rollers is also adopted, which gives instant flush when the handle is moved.

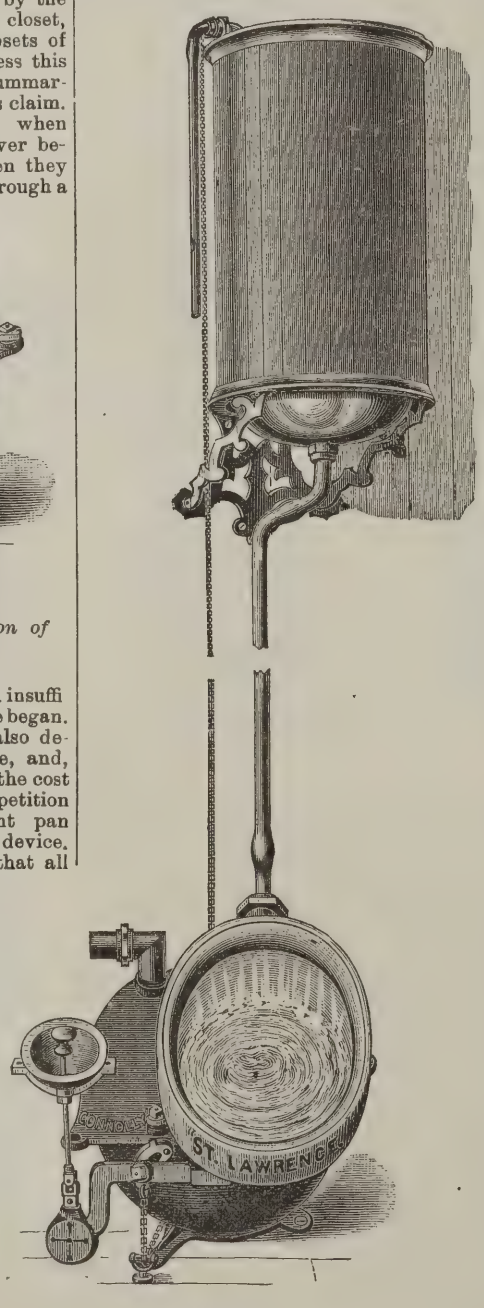
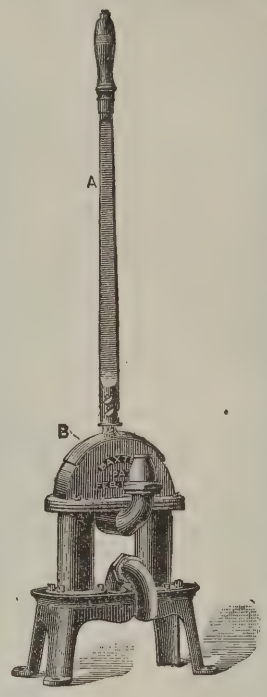


Fig. 3.—General View of Closet and Cistern.

The Bundy Radiator.

The A. A. Griffing Iron Company, 454 Communipaw avenue, Jersey City, with branch office at 42 and 44 West Monroe street, Chicago, send us their 1886–87 catalogue and price list of the Bundy patent radiators which they manufacture. During the past year the A. A. Griffin Iron Company have erected additional buildings, and purchased new machinery, especially designed for their work, thus largely increasing their facilities. In the first part of the volume are presented illustrations with accompanying tables of sizes and prices of the different styles of the Bundy direct radiator, the Bundy hot-closet dining-room radiator, the Bundy indirect radiator of different styles with plain and extended surface, and Gold's pin indirect radiator. In the succeeding division of the catalogue, both sectional and perspective views are given of the different Bundy radiator loops, and the Thompson radiator loop. The next few pages are devoted to direct-indirect radiators, after which the subject of hot-water radiators is taken up. The catalogue proper closes with illustrations and price list of vertical tube, antique brass direct radiator screens. Some 40 pages at the back of the catalogue are occupied with testimonial letters, printed in *facsimile*, and a long list of references. The catalogue is a volume some 9½ x 12 inches in size, tastefully bound in dark green cloth. The paper is of fine quality, the engravings are carefully executed, and the letter-press excellent, making the whole a very handsome volume.



Baxter's "The Climax" Pump.—Fig. 1.—General View of Pump.

The Climax Pump.

Fred Adee & Co., 90 Beekman street, New York, are sole agents for The Climax pump, made by Baxter Bros., general views of which are shown in the annexed illustrations. The principal claim made for this pump is that it has no piston rods and packing boxes, and consequently does away with the wear and friction of those parts. It is said that these pumps will work easier and last longer than those made in the old way. By referring to Fig. 2 it will be seen that in place of the usual stuffing-boxes the spindle carries a curved plate or slide-valve (2), which conforms to the top of the air chamber. The sliding plate is held against the top of the air chamber by means of the coiled spring (3), and is said to make a perfectly air and water tight joint. On the outside of the air chamber is a sliding cover, B, Fig. 2, which prevents the entrance of dirt. All parts of the pump except the handle and stand are made of brass. It is stated that the greater simplicity of this pump as compared with the old styles of same capacity permits of its being sold at less price.

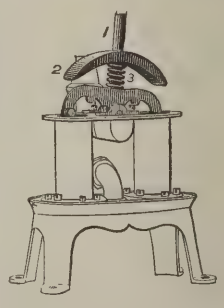
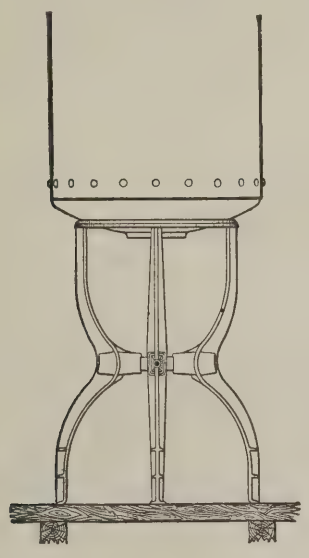


Fig. 2.—View of Pump With Cover of Air Chamber Removed.

Creque's Patent Range Boiler Stand.

The Creque Mfg. Company, New York and Brooklyn Bridge Warehouse No. 16, New York, are putting on the market Creque's Patent Range Boiler Stands, a general view of which is shown in the accompanying cut. The object of the in-

ventor was to overcome what he considered objectionable features in the stands in common use, and produce in their stead a simple, strong, cleanly and serviceable article. The device is described as Creque's patent "sanitary, reversible, adjustable, reducible, vertical hot-water circulator" or range boiler stand. The stands are also made applicable to horizontal boilers and sinks. The existing range boiler stands are said to be constructively weak, are unadjustable and support the boiler bottom only at the circumference. Furthermore, the supporting ring, which has a vertical flange at its circumference, becomes a recepticle for dirt and filth, and the same is said to be true of the bottom of the base within which collect dirt and dust from the floor. In the Creque stand it is claimed that all these objections are overcome. These stands are composed of three or more supports or legs fastened together near the middle by a suitable connection. The parts, which are few in number, are designed for lightness and strength, and are all made interchangeable. The supports are made in lengths of 21 and 30 inches for different hights of boiler, but are similar in shape and fit interchangeably the various forms and sizes of connections. The lower

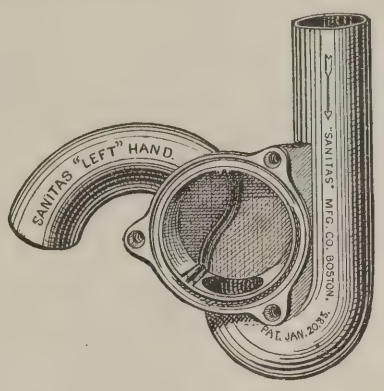


Creque's Patent Range Boiler Stand.

section of the supports are provided with a number of lugs intended for use as breaking points by which the supports can be shortened more or less as desired for fitting the pipe connections. The lower sections of the supports are curved outward 1½ inches more than the reverse section which gives a large and firm supporting base. The ends of the supports are alike in shape and size, and terminate in a broad, outwardly turned, overlapping flange, which provides an ample bearing surface, serving as a suitable rest or seat for the bottom of the range boiler, also for rings when used, and for standing upon the floor. Tests made by Fairbanks & Co. show that the stands having three supports sustained from five to six tons, these with a greater number of supports being proportionately stronger. The connections are provided with three or more radial arms, hollow, of wedge shaped section and perforated with numerous holes which allow of adjustment of the stands for different sized boilers. The smallest stand, which weighs 10 pounds, can be adjusted to boilers of eight sizes from 11 to 18 inches in diameter. The other stands are likewise adjustable. The supports are secured to the connection by short bolts which press the wedge-shaped arms of the connection to a firm bearing in the sockets of the supports. The connections are made with three, four and five arms. The stands, which are reversible, are provided with supporting rings if desired, as shown in the cut, though it is said they are not necessary. The stands are made of best quality gray iron, and are finished plain, bronzed and galvanized.

New Sanitas Specialties.

The Sanitas Mfg. Company, of Boston, Mass., who have recently occupied new quarters at No. 207 Tremont street, near Boyleston street, are directing attention to several new Sanitas specialties which they have just ready for the market. These specialties are in the shape of additions to and modifications of the traps, with which the



New Sanitas Specialties.—Fig. 1.—The Sanitas "Left Hand" Trap.

public are already well acquainted, which are made necessary in adapting the goods to general use. The Sanitas trap is now made in various convenient forms to suit the varying positions of the fixture, outlet and waste-pipes. The first of the accompanying illustrations represents the Sanitas Left-Hand trap, and shows the parts removed, indicating the construction of the device. Right-Hand traps of a similar character are also supplied. The company are also producing a Sanitas trap with a swivel joint, which has been designated the Sanitas Universal Trap, an illustration of which appears in Fig. 2 of the engravings.

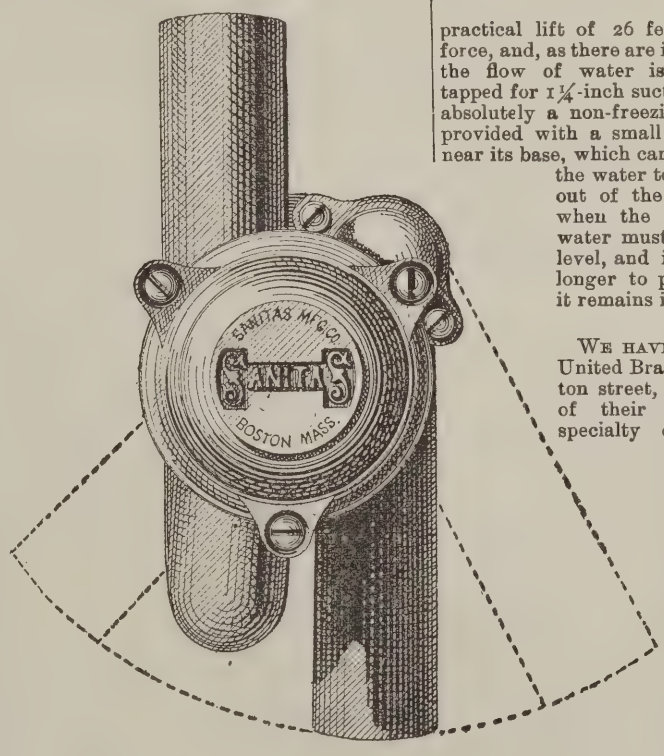
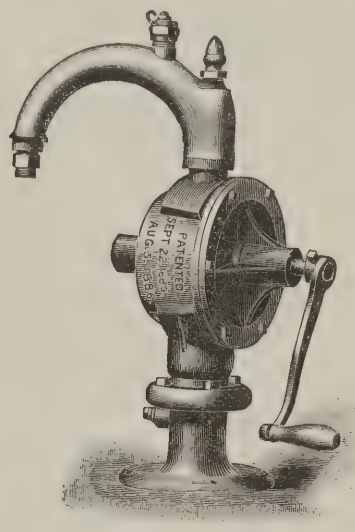


Fig. 2.—The Sanitas Universal Trap.

This form of trap was invented and manufactured at the time when the original trap was first made, several years since, but it has only recently been cast in quantities, in a mold, and put upon the market. It is designed for use where the position of the waste-pipe is not known beforehand. The outlet arm is constructed with a swivel joint made tight in the same manner as are the clean-out caps on the bodies of all of this series of traps. The adjustment is accomplished by the use of an ordinary screw-driver. This arrangement, the company assert, renders the trap easy to set in places difficult of access. A running trap of the same series is also manufactured, which may be adapted quickly and conveniently to any position.

The Cary Revolving Piston Force Pump.

The Cary Mfg. Company, of Fairhaven, Mass., are putting on the market an ingenious form of revolving piston hand-force pump, of which we present an engraving. The pump proper is without packing or valves, and little difficulty is hence encountered in operating it. The Cary Mfg. Company also make a deep well pump constructed on the same principle. The force pump, shown in the cut, is made with either an iron or a brass revolving head. This pump has a



The Cary Revolving Piston Force Pump.

practical lift of 26 feet, and has a good force, and, as there are in effect four pistons, the flow of water is continuous. It is tapped for 1¼-inch suction pipe. It is not absolutely a non-freezing pump, but it is provided with a small trip valve or cock near its base, which can be turned to allow the water to remain in or run out of the pump. Of course, when the valve is open the water must be raised from its level, and it will take a trifle longer to pump it than when it remains in the pump.

We have received from the United Brass Company, 79 Fulton street, New York, a copy of their illustrated sanitary specialty catalogue for 1887 containing goods brought out since their last catalogue was issued. The publication is in pamphlet form and contains about 100 pages, the greater number of wh ch are devoted to water-closets and water-closet attachments, manufactured by the above company. Some 15 styles of Craigie's closets are illustrated, while the Paragon and Eagle hoppers are also shown arranged in different ways. The series end with the Eureka and other closets. The next 10 pages of the pamphlet are devoted to Craigie's flush tanks and cisterns, of which broken views are given so as to show the valve mechanism. The goods referred to toward the end of the catalogue include bath-tub casings, washstands, decorated wash-basins, porcelain bath-tubs, urinals, &c. An alphabetical index in the front of the volume renders reference easy.

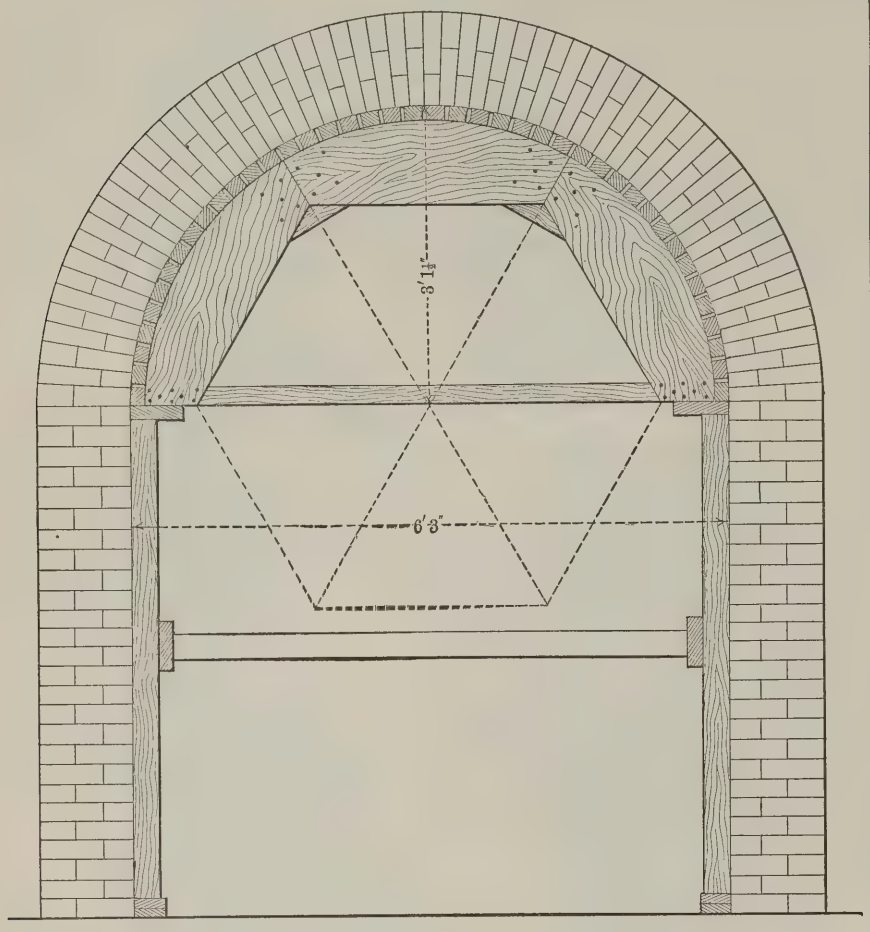
Practical Centering.*

BY OWEN B. MAGINNIS.

Since the modern practice of centering is based on a well-tried system, it follows that simple centers employed in ordinary construction are similar in character, and are all planned in accordance with well-defined rules. The fact is plainly exemplified in Fig. 1 of the accompanying illustrations. In this a center is constructed following the rules explained in the February number. It is made up of three principal bearers, the outer edges of which are curved to the required arc. The illustration also shows how a semicircular arch is subdivided into an equal number of parts, in which the bevels for the butt joints are always the same. It is not, however, always the case that the rough boards are of equal width. In many instances they are scrap stuff, so that the bevel shown in Fig. 2 cannot be applied. In such cases it is usual to lay out the curve and spring line, full size, on a floor. Divide the curved line into three equal spaces, as seen in Figs. 1 and 4, and draw lines to the center point. By placing the rough boards over these lines, as indicated by the dotted section in Fig. 4, the bevel on the butt joints can be easily marked with a pencil or knife; then, by sawing on the mark, the joint will be obtained. The frame shown in Fig. 1 is stiffened by broad tie battens nailed across the beveled joints, as shown in Fig. 4. If the bearers be narrow, supporting braces must be nailed on the battens above and the tie piece running in the direction of the joint lines, to support the joint. Cross battens on the top edges of the curved bearers may be ⅞ inch thick or of any other convenient thickness, but a thickness must be allowed for in striking the curves. The center thus constructed is set up as before, placed on upright joists and wedges and sheathed in place between the jambs. In cheap work it is not the rule to employ wedges, but their use is obvious and therefore necessary for the purpose before stated. In Fig. 5 another form of center is shown and one that involves more skill and more careful consideration than anything we have so far described. The center is that which would be required in building an elliptical stone arch of 4 feet span. The plan of construction followed resembles that of the 4-foot horizontal arch already referred to, but, inasmuch as the curve is different, a different plan is followed, and getting curved bearers requires more labor. There are various methods laid down in the books used by mechanics for sweeping elliptical curves. A very desirable one for general use is that indicated in Fig. 6. The illustration referred to shows an elliptical curve struck by means of a sliding trammel. As this instrument is in daily use in all shops of any pretensions throughout the country, it is well known, and therefore requires very brief description. It consists of two ⅞ x 2 inch grooved cross pieces halved together. Slides are provided in which pins are inserted. To these pins a trammel rod is fixed which works at the required distance necessary to trace the curve. The trammel is set here as in all cases—that is to say, the distance from the lower pin to the tracer is equal to half of the long diameter—in other words, the spring line or major axis of the elliptical arch. The distance from the upper pin to the tracer is equal to half the short diameter of the elliptic arch or its rise. The curve shown is for the bearers in Fig. 6, one of which is shown in the left hand part of the sketch. Of course, the center lines marked on the ends of the trammel are placed directly on the center lines of the draft board; it is there tacked fast.

Fig. 3 illustrates another common method of striking an elliptical curve. It is the method commonly known as intersection of lines. It is not nearly so desirable for use in practical work as the one illustrated in Fig. 6. The same mode of construction and setting as was used in the horizontal arch is employed in this case.

Since arches of wide span necessitate large *voussoirs* to resist the strain acting on their extrados or upper side, wide spans called for larger centers and strong reliable construction. The elliptical span gateway shown in Fig. 9 illustrates this. Owing to the size and shape of the stones employed in this work, considerable weight rests on the center used for the purpose. There is also another feature connected with this center which must be considered and allowed for. The key-stone projects 1 inch below the face of the soffit. The center is therefore built in a way to make allowance for this. On a clean level floor, the spring line is drawn, as shown in Fig. 8. Having an arch of 10-foot span, this line would be run, probably, 12 foot long. A center point is established from which a line is drawn, square up, extending to the hight of the rise of the frame, in this case 1 foot 5 inches. The line is continued below the spring line as indicated. The trammel is then set as already described, and the elliptical curve drawn. To find the beveled joints we divide the curve into four equal parts, and mark on the spring-line the distance from the spring point to the first division. We join these by a straight line, which gives us the direction of the bevel joints. Place the rough board, out of which the center is to be made, so that they will be wide enough to cut the curve and mark them out, as shown in the illustration. Cut out of the middle piece a notch for the key-stone, measuring the width on each side of



Practical Centering.—Fig. 1.—Wide Span Semi-Circular Center.

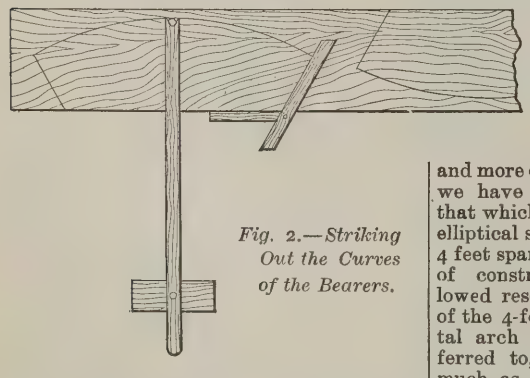


Fig. 2.—Striking Out the Curves of the Bearers.

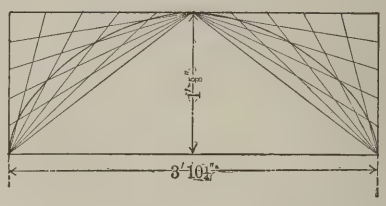


Fig. 3.—Elliptic Curve from Intersecting Lines.

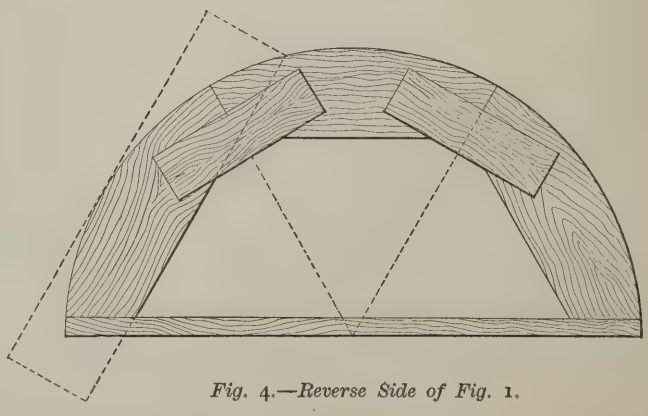
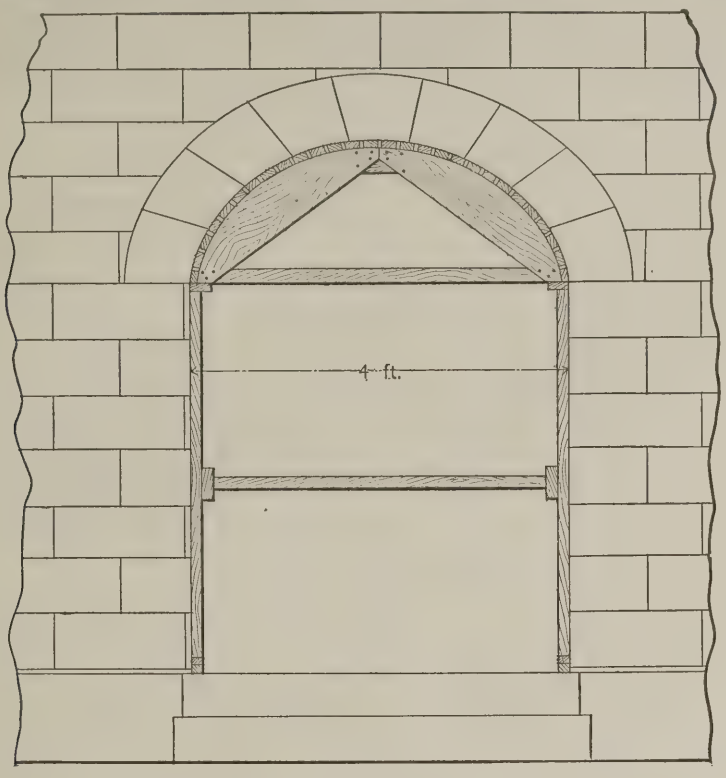


Fig. 4.—Reverse Side of Fig. 1.

*Copyright 1887.

the vertical center line. This frame, like the one shown in Fig. 1, is stiffened by battens resting on two braces, as in Fig. 4,



Practical Centering.—Fig. 5.—Elliptical Arch Center.

or cut on the top edge of the lower tie-piece and halved across it. The dimensions

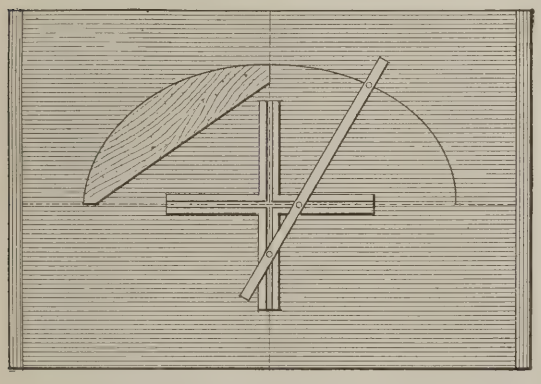


Fig. 6.—Striking an Elliptic Curve with Trammel.

of the pieces are as follows: Curved bearers 1½ inches thick by 12 inches wide, tie-piece 2 x 6 inches, battens across joints 1½ x 8 inches, supporting braces 2 x 4 inches; the whole is firmly spiked together with 20d. spikes. The top of the center is covered with 1-inch cleats, spaced ½ inch apart. The bottom cleats are 2 x 4 inches, the uprights 3 x 6 inches, and the shore between the beams 3 x 6 inches. Great care must be exercised in setting a center for stone work, since different stones are worked exactly to their shape and size, and the center must be perfectly true, so that the joints will come right.

Egg and Anchor.

With reference to the origin of the molding egg and anchor, sometimes also called egg and dart, A. P. Decandolle says:

The egg and the anchor, or arrow-head, so general in architectural ornaments, are supposed to be emblems of fertility and reproduction. The arrow-head is supposed to represent the leaf of the *sagittaria sagittifolia* a plant which grows in water throughout Europe, and also in China and India; and the egg, the emblem of fertility, to be an imitation of the cyamus or sacred bean, whose history is given in "Exot. Bot." v. 1, 59 (Smiths "English Botany," vol. iv., p. 145). The cyamus of Theophrastus, of Salisbury, and of Smith, is the *nelumbium speciosum* of some botanists of this day. It inhabits slow streams and muddy and stagnant waters in the hotter parts of Asia; the semblance of it is frequently met with upon Egyptian monuments and coins. Kircher has stated that in the representation in Chinese pictures of Amydas or Fumbo sitting upon a throne, the throne is designed from the flower of this plant. The part of the plant which bears the nuts is of the figure of an inverted cone that is broader than high, and has a number of cells, each with one end open, situate in its upper part, the base of the cone; this resembles an instrument in use in a game called by the French, from a very early date "lotos"—a word which is one of the ancient names of this plant. Each cell includes one nut, of about the size of a hazelnut, whose kernel is reputed to be the Egyptian bean which Pythagoras forbade his followers to eat. The plant now common in India and South China has been long deemed there one of the sacred plants.

A Study in Rough-Cast.

BY C. POWELL KARR.

In England rough-cast is composed of washed gravel mixed with hot hydraulic lime and mortar. It is applied in a semi-fluid state, and is used much more frequently than in this country. The ornamentation in vogue is generally confined to plain flat work rather than figures in relief, the only substance in relief consisting of

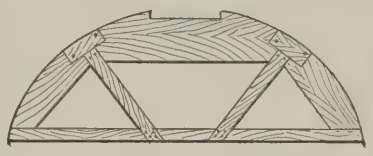


Fig. 7.—Reverse Side of Fig. 7.

pebbles, irregular stones, bits of glass and obsidian. The custom with us is to use hydraulic cement and clean sand, mixed up with sufficient water to produce the mortar of ordinary consistency for plastering, and in such quantities that all may be used up before the batch begins to set. The proportions are one volume of stiff cement paste to 1.66 volumes of damp, compact sand, or, if measured dry, one volume of cement powder to two volumes of loose, dry sand. The mortar is applied in two coats, laid on in one operation. That which is used for the first coat should be somewhat thinner than that for the second, in order that it may be pressed into thorough contact with the wall and enter and fill up all the joints and other

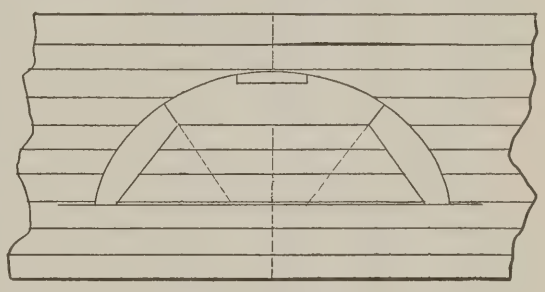


Fig. 8.—Laying Down an Elliptical Frame.

openings, if on a brick or stone wall, or the interstices in the framework of lathing, if a frame house. The second coat is applied upon the first while the latter is yet soft, so

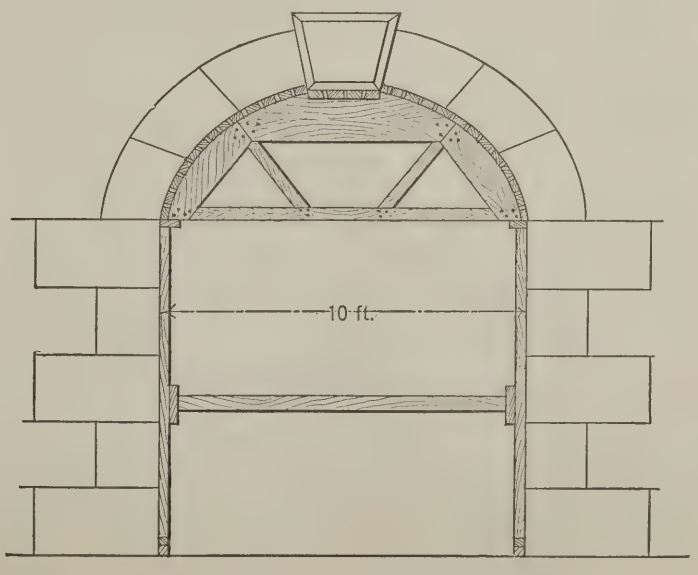


Fig. 9.—Center for an Elliptical Gateway.

that the same workman finishes off as he goes along, never covering more than two or

three superficial feet at one time. The two coats thus laid on should form one compact coat of about ½ to ¾ inch in thickness. It should be shaded from the direct rays of the sun for several days and moistened from time to time. For brick or masonry rough-cast Mr. Trautwine recommends the following: Slack ½ bushel of lime, then fill a barrel two-thirds full of water and add a

be observed that the detail drawings of the study presented in Plates XXII and XXIII, differ slightly from the complete design, and the difference is intentional. It serves to show with what a slight change and how readily the design may be varied. In Fig. 2, for instance, the center circle may be marked as indicated by the parallel lines, by either black mortar used in the second coat,

Fig. 2, may consist of one uniform black coat of mortar. Allow it to partially stiffen, and then take white mortar to which sulphate of zinc has been added, and, with a quick edging motion of the trowel, slash in the white divisions, thus marking off the black squares. That part of the design which appears on the sides and at the extreme top, to consist of irregular triangular

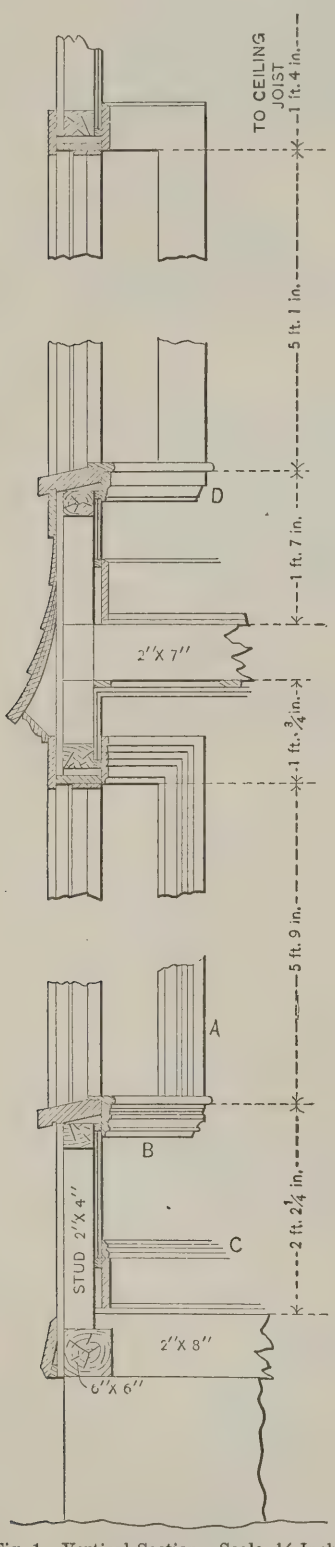


Fig. 1.—Vertical Section.—Scale, ½ Inch to the Foot.

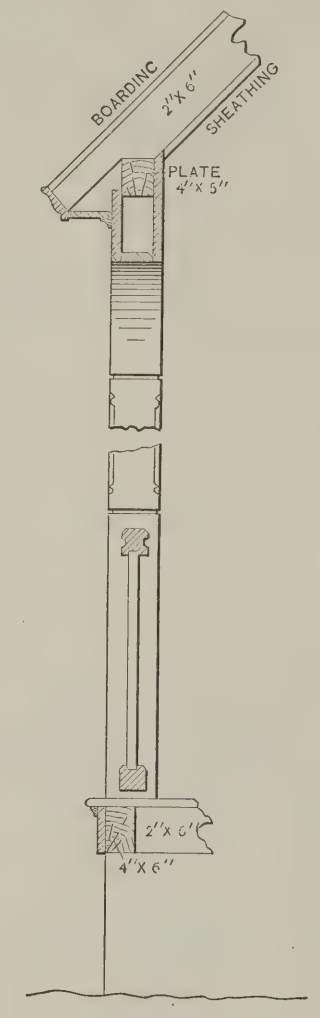


Fig. 2.—Front Porch.—Scale, ½ Inch to the foot.

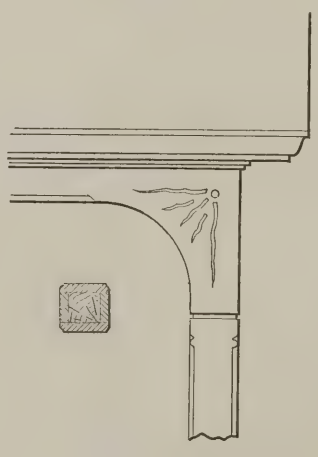


Fig. 3.—Front Porch.—Scale, ½ Inch to the Foot.

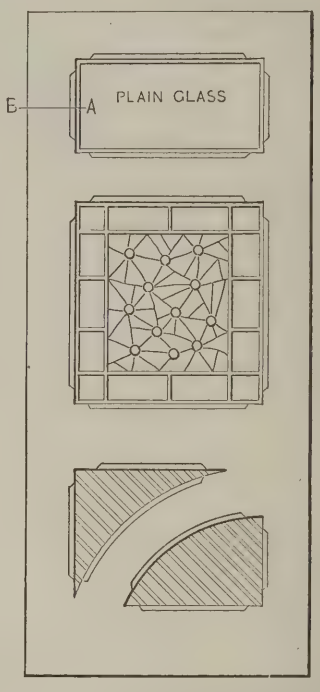


Fig. 4.—Front Door. Scale, ½ Inch to the Foot

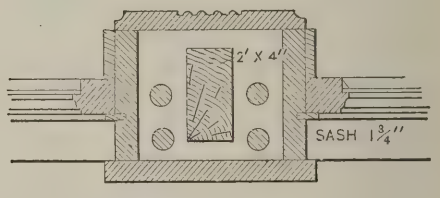


Fig. 5.—Section through Window Frames.—Scale, 1½ Inches to the Foot.

Fig. 6.—Enlarged Section on Line B A of Door.

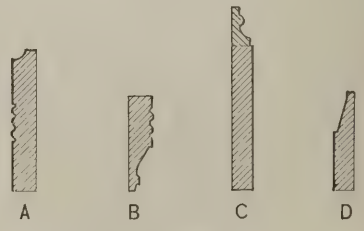


Fig. 7. Sections Indicated by Letters, Fig. 1.—Scale, 1½ Inch to the Foot.

Details of House by John F. Stanton. (*See Plate XXI for Perspective View and Plans.*)

bushel of hydraulic cement, add 3 pounds of sulphate of zinc, previously dissolved in water. The whole should be of the thickness of paint and may be put on with a whitewash brush. The wash is improved by stirring in a peck of white sand just before using it. Portland cement is the most durable. A wall with a northern exposure in Philadelphia was coated with it in 1860, and 20 years later was reported to have been in perfect condition. It will

the coat underneath being white or gray, or it may be marked so as to indicate the design by broken bits of hard coal no larger than a pea closely crowded together, and stuck in the first coat by hand, and lightly tapped with the handle of the trowel to give the mortar a good hold upon them. The radial lines, wherever shown in the drawings, may be put in with the trowel, using black mortar, slashed in with a quick throw of the trowel. The squares, as shown in

particles, are irregular bits of broken brick or terra-cotta or red slate, arranged by hand so as to preserve the radial outline. They are crowded in the second coat flush with its surface. The bands of pebbles are sufficiently indicated, any color of pebbles being used at will. The rays may consist of broken bits of old bottles, perfectly dark green in color. Or should it be desired to work out the design in red and gray, the black squares can be made red squares, using

red mortar, colored with oxide of iron, or broken bits of terra-cotta crushed into small fragments with all of the dust removed can be used to good effect. A good contrast can be secured by converting the indicated squares into vertical bands alternating black and white or alternating red and black in the same manner as above. The four very black squares in the center can be made of obsidian.

In Fig. 3 the spirals can be slashed in quickly with the trowel, using black mortar after the second coat is on. The pebbles need no explanation. The effect will be more picturesque if occasionally one or two of the pebbles happen to be covered by the second coat. The shaded radial lines can be treated by any of the methods suggested for the indicated squares in Fig. 2. Quaint and dainty sea shells may take their place by being bedded in the second coat of mortar. The ground work of Fig. 3 should be a mellow creamy gray, and can be brought up to the required shade by a little yellow ocher mixed into the second coat. It should be roughened with a scratch brush, or by mixing hair in with the mortar a peculiar rough appearance may be obtained which will be highly effective.

In Fig. 4 nothing new is shown. Everything is in flat work except the pebbles. The triangular pieces may consist of irregular bits of brick bedded firmly in the mortar, or old oyster shells may be broken in two and the interior or pearly lining may be exposed, the backs being imbedded in the mortar. The irregular reflection of the light from these pearly surfaces produces many pleasing contrasts. In the completed design the different parts are separated, as indicated by plain masses of rough cast, toned down to an ashy gray. This tint can be obtained by mixing in with the mortar coarse particles of crushed coal cinders that have been thoroughly washed to free them of dust. This mixture, if properly made, will give the cold-gray tone of a November sky. It is very difficult to get, but when it is obtained the effect is wonderfully beautiful. The general tone of the whole work should be a contrast of grays and creamy yellows, or dull reds and deep grays. No scale has been given, because the design can be arranged to suit any dimensions or inclination of roof. In the present design the slope is 1 to 1. The detail of Fig. 2 can be put on more cheaply than the corresponding part of Fig. 1, and the same is true of Fig. 4. In Fig. 1 the alternating squares of black and white can be put on quickly by constructing a framework of heavy wires crossing each other in squares. Lay this close to the first coat and fill in the black spaces first, then fill in with white or gray or red mortar the remaining squares and true up with the trowel's edge. The work in the drawings appears to be more mosaic than the actual work would appear to be, and it is not intended to be mosaic, as most of the work can be done with the trowel.

Rough-cast work is expensive in the matter of first cost, particularly where the design is elaborate, but if well done it will last many years and give a permanent beauty and variety to a house obtainable in no other way. The most successful attempts have been achieved in the use of flat work, and in dull colors, glittering, nondescript material that does not confess itself at once is annoying rather than pleasing. Pebbles, sea shells, and any fragment of nature's handiwork cast up from the sea, affords an inexhaustible array of pleasing objects suitable for rough cast work, but to manufacture results of glass work and to devise terra-cotta ornaments to be used in rough-cast is an abomination and should not be tolerated.

Sales of real estate in New York City since January 1 are computed to reach $50,000,000, taking the figures of the Real Estate Exchange as a basis of calculation, although the sales recorded meanwhile in the Register's office are double this amount, of course including old transactions.

ROOFING NOTES.

Copper Roofing.

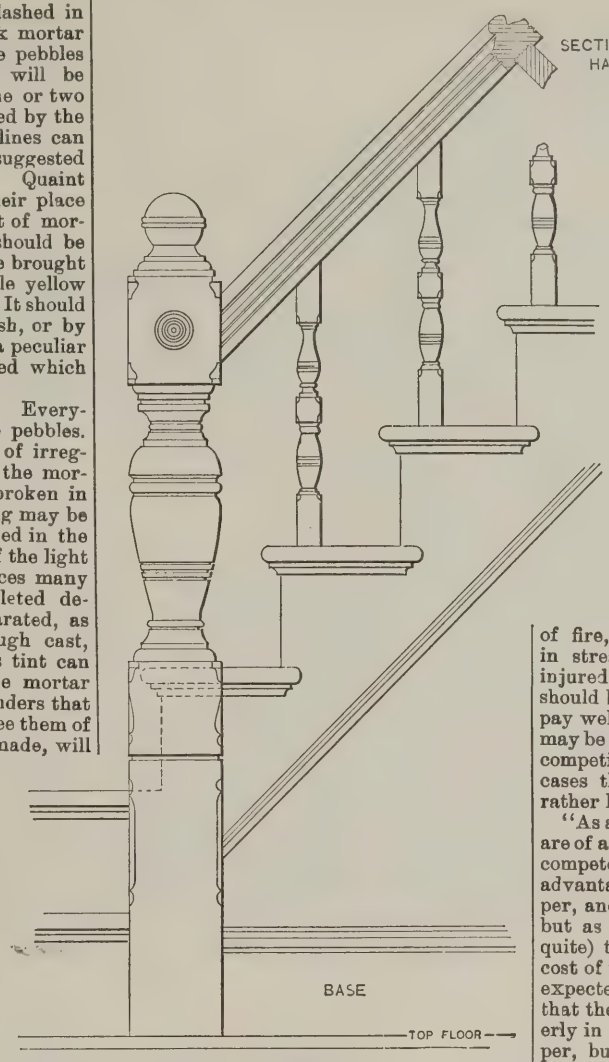
In a recent issue of *The Metal Worker* there appeared the following:

We have in the past directed our readers' attention to the advantages of copper as a roofing material, and have also taken occasion to point out to copper manufacturers the opportunity that they are allowing to pass unimproved for causing copper to be used for roofing purposes in much greater quantities than at present. We have suggested to the copper trade of this country on different occasions the propriety of emulating the Ville Montagne Zinc Company in the work that they did in introducing zinc roofs into Great Britain and certain portions of Continental Europe many years since. What we have said so far has seemed to go for naught, and, while the use of copper for roofing and for the purpose of cornices and general architectural adornment is on the increase, it is not being used to such an extent as its merits justify.

While there seems to be great apathy in this country with reference to the more extensive employment of copper, there is activity on the other side of the water. Copper roofing in England is being pushed energetically, and is being employed in many cases in competition with zinc and lead, which are the ruling metal roofs in that part of the world. In evidence of this it gives us pleasure to lay before our readers the substance of an advertisement which is now running in some of the English building papers, and which proceeds from Ewart & Son, 346 Euston road, London. It contains interesting reading for all who are engaged in the roofing business, and we commend it to the attention of the copper trade as well. Omitting simply the heading and the closing sentences of the advertisement, which are of the usual conventional type, the advertisement in question is as follows:

"The low price of copper has brought it into the market as competitor on favorable terms with other metals for many purposes. For none of these is it more suitable than for covering roofs. The desiderata in a covering of roofs are precisely those which copper is best fitted to answer, and only the high price of the material kept it from general use and allowed inferior metals to take the place which none of them can fill so well. Now, however, that copper can be bought at less than half its former price, its value as a roofing material is being recognized, and, if only it is properly laid, it will be more and more appreciated. As against lead, copper possesses this most important qualification for roofing purposes, that it may be used advantageously at one-fifth the weight of lead—that is to say, that a building which would require five or six tons of lead to keep it weather-proof may be rendered equally secure, and for as long a time, with one ton of copper. But besides this immense advantage the copper will be found to be actually more durable than the lead on roofs where there is any kind of traffic, and in case of fire, while lead would be poured down in streams, the copper would remain uninjured. Even if the cost of laying copper should be higher than lead, it would often pay well to use it, especially as a good deal may be saved in timber framing, but in close competition it will be found that in many cases the copper can actually be done for rather less money.

"As against zinc, the advantages of copper are of a different kind. It cannot, of course, compete with zinc in first cost, since zinc is advantageously laid nearly as light as copper, and is only one-third the price per ton, but as the cost of the labor is nearly (not quite) the same, the difference in the total cost of the roof is not so great as might be expected. Approximately it may be said that the total cost of covering a roof properly in zinc will be about half that of copper, but the durability of copper may be taken to be three time or four times that of zinc, so that a building properly covered with copper may be considered permanently weather-proof. It is also an advantage that the drips necessary for zinc may, if desirable, be dispensed with for copper, so enabling the builder to give a greater interior headway without increasing the hight of the building. The greater toughness of copper also makes it possible for a good workman to boss and groove joints by hand, which in zinc must either be made by stamping, thus



Details of House by John F. Stanton.—Fig. 8.—Newel and Balusters.—Scale, ¾ Inch to the Foot.

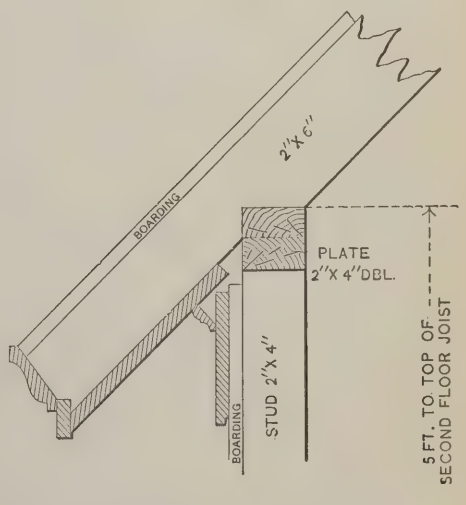
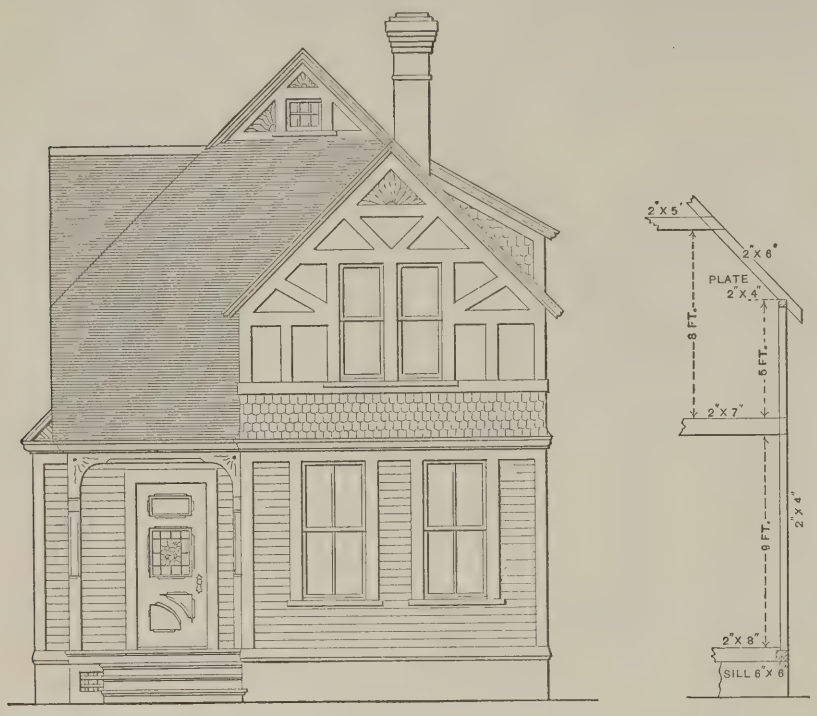


Fig. 9.—Main Cornice.—Scale, ¾ Inch to the Foot.

injuring the metal, or else by soldering, which is liable to give way. It is of great importance that copper should be laid by skilled workmen. It is not only necessary that it should be laid in the right method, but also that it should be properly handled.



Front Elevation of House by John F. Stanton.—Scale, ⅛ Inch to the Foot.

We offer the guarantee of half a century's practice in the manufacture of metals and covering of roofs, also that we employ the best workmen."

Items.

THE PORTER IRON ROOFING COMPANY issue a pamphlet of 62 pages devoted entirely to testimonials concerning their roofing. In date they cover several years of time, many of the letters being quite recent. They are arranged in the form of communications from different correspondents in different States. It is a presentation of the merits of the roof which this company manufacture that cannot fail to carry conviction to the minds of those who peruse it.

WE HAVE RECEIVED from the Metallic Roofing Company, of Canada, with office at No. 82½ Yonge street, Toronto, copies of their current circulars and price lists. The company is manufacturing metallic sheetings and sidings under the different Montross patents. The first page of the circular shows the coal office of J. R. Bailey & Co., Toronto, which is roofed and covered with the No. 2 shingle shown in the catalogue before us. The Cortright Valley and Ridging is shown in some of the cuts of the roofing illustrated.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, of Cincinnati, Ohio, have just issued their new catalogue, an announcement of which was made in our columns some time since. The work is entitled "Third Series," and 20,000 copies is said to be the issue. The book contains 72 pages, exclusive of the cover, and measures 8½ x 9¼ inches. The cover is of tinted paper, on which a very appropriate title page is printed, among the legends of which "Iron Roofing" is specially prominent. The paper and letter press of the inside is good, and the illustrations are among the best that have been prepared by any of the roofing companies. They are far more numerous than those of any other similar catalogue with which we are acquainted, and show the industry in a very satisfactory manner. All the different styles of roofing, both plain and corrugated, which the company manufacture are treated, and are supplemented by illustrations of buildings to which the work has been applied engraved from photographs. The special tools, which the company have provided for use in handling the different specialties which they manufacture are illustrated. Considerable space is given to the subject of sheet-iron ceilings, and numerous illustrations are presented. Mitered moldings for ceiling finish, rosettes and panel strips are also included. A number of illustrations from this work have recently appeared in our columns, so that our readers, in a measure, are familiar with them. The catalogue is one that every roofer should have. The work of the company is subdivided into departments, and not less than 10 of these are recognized in this book.

THE REORGANIZATION of the National Sheet Metal Roofing Company, with office and works at 510 East Twentieth street, New York, made necessary by reason of the death of Mr. L. W. Wallace, secretary and treasurer of the company, results in several important changes. Mr. N. McClure, who has been president of the company, we believe, since its organization, retires, and in his stead Mr. A. F. Ahlum has been elected to the office of president. The general management of the company for the future devolves upon the president, an office to which Mr. Ahlum brings a long experience, gained in tin stamping business. Mr. C. B. Cooper, who has been superintendent of the company in the past, assumes the office of secretary and treasurer in the new organization. His duties, however, do not materially change on account of the new titles that are appended to his signature. He will still be responsible for the mechanical features of the goods manufactured. Mr. H. W. Buttorff continues as vice-president. We understand that the company's business opens up very satisfactorily and promises well for the season.

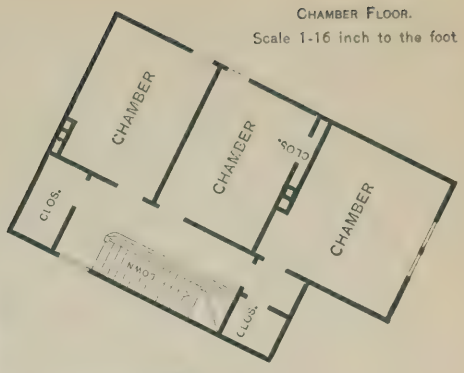
A NEW FORM of sheet metal ceiling was patented by Frank Mesker, of the well-known firm of Mesker Brothers, St. Louis, Mo., a short time since. The features shown in the patent specification and covered by the claim relate to the construction and to the adjustment of parts by which the lapping of sheets is obtained and by which longitudinal and cross ribs are made to form panels. At the same time the construction facilitates the ready putting up of the ceiling and the work covers the fastenings.

A SPECIAL CIRCULAR has been issued by the Cincinnati Corrugating Company, relating to shutters and doors. Different styles of double thickness shutter are illustrated and directions for measurements are given. Details of hinge eyes, to be used under different circumstances, are likewise shown.

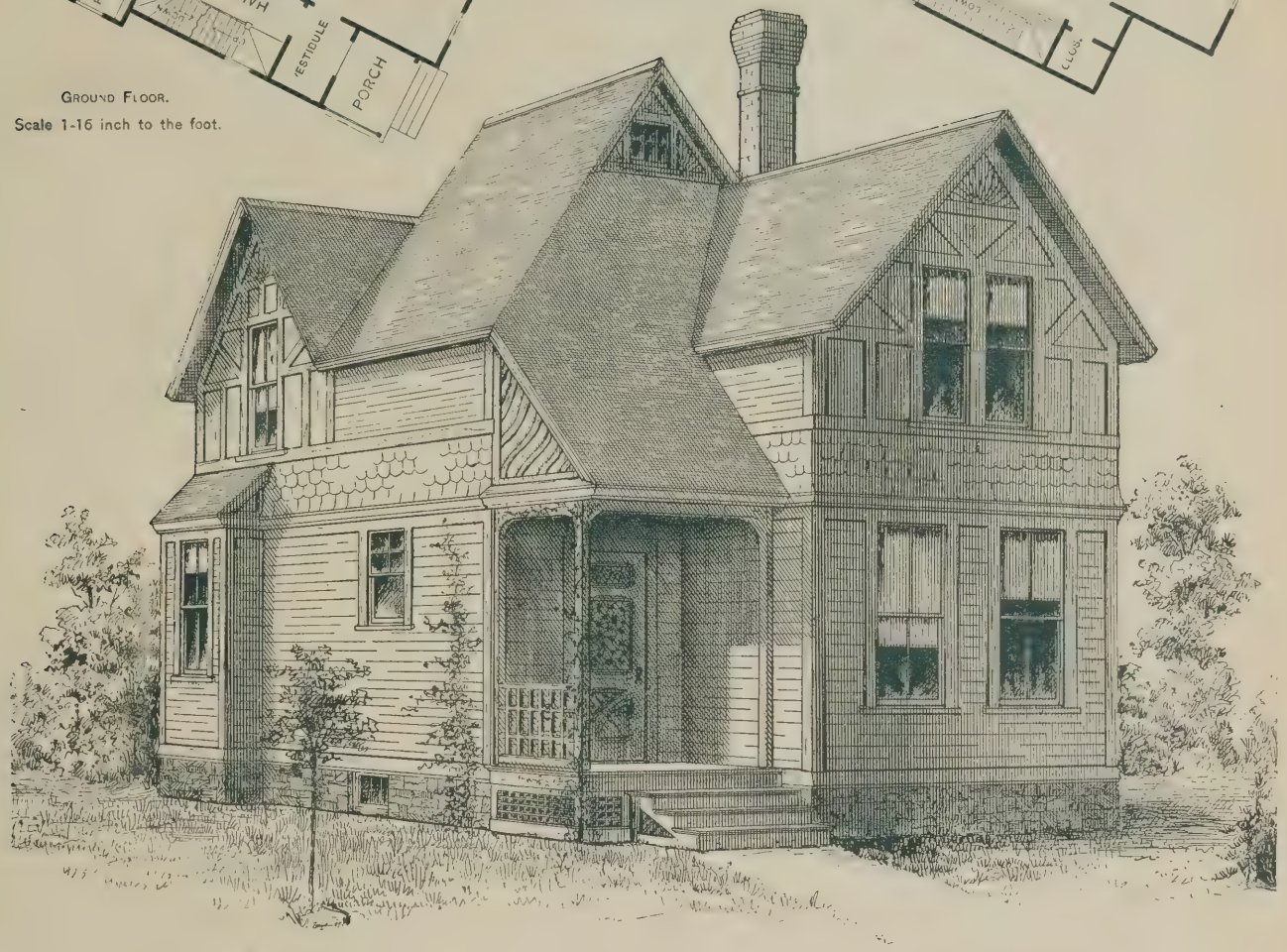
THE CIRCULARS and samples which the Bodine Roofing Company, of Mansfield, Ohio, are sending out are a very happy presentation of the general subject of roofing from the standpoint of this company. A small pamphlet of 32 pages is entitled "A little Talk on a Big Subject," and describes the roofing of the company in a very satisfactory manner, and contains, among other things, certificates from insurance experts and others concerning the value of the roof. The samples mailed are some 3 x 4 inches in size, and illustrate the roll cap, which is now a feature of this roofing. The roof is held in place by wire nails, driven through tin cleats or buttons, which are sufficiently embossed to give a bearing against the surface of the roof throughout their periphery. A curved boss is provided for use in driving nails through the bead which separates the sheets lengthwise. Among the circulars is one containing very explicit directions for putting on the improved Bodine roofing.

Side Elevation.—Scale, ⅛ Inch to the Foot.

Ground Floor.
Scale 1-16 inch to the foot.

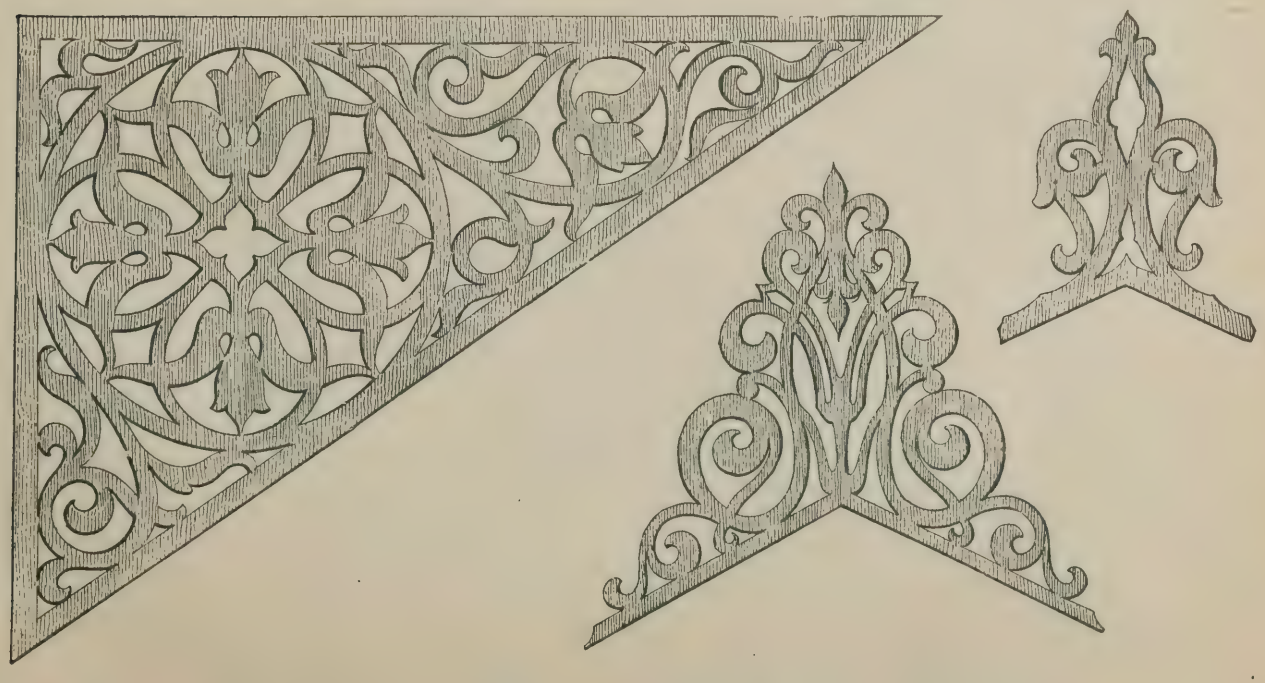


Chamber Floor.
Scale 1-16 inch to the foot



Perspective View of House Designed by Jno. F. Stanton, Manchester, N. H.

For Elevations and Details, See Pages 112 to 114.



Sawn Scroll Work for Porches and Gables.

Study in

(See Article Page 111.)

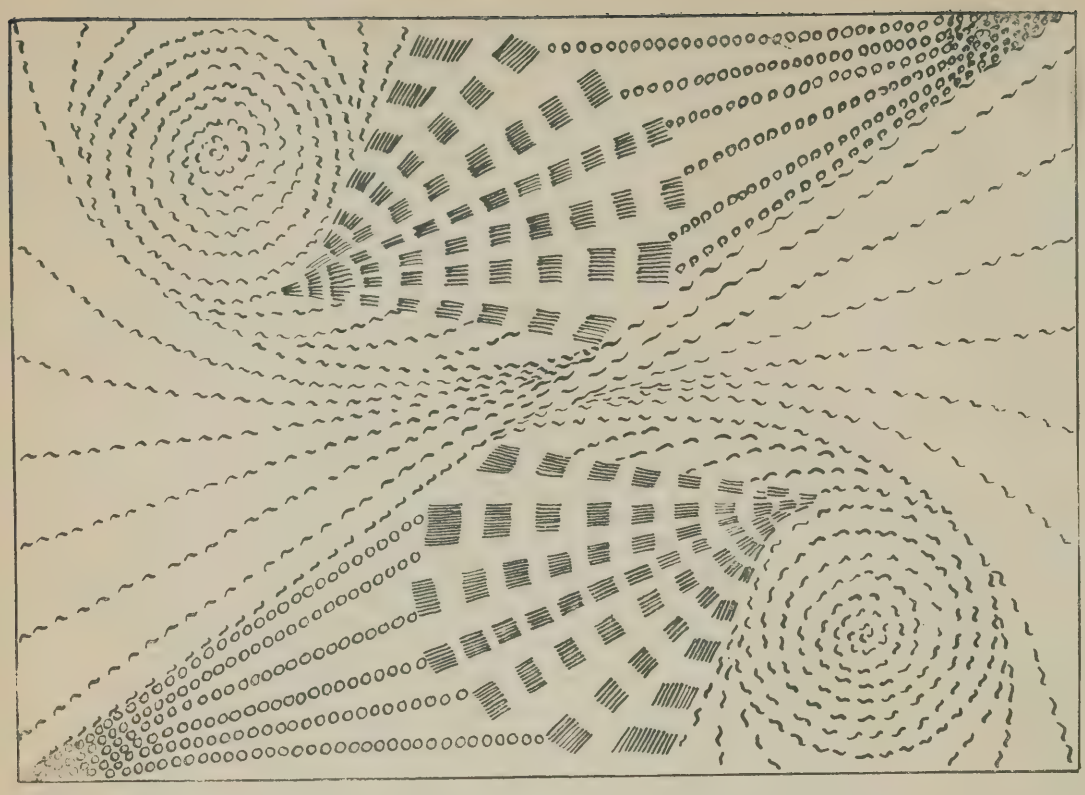


Fig. 3.—Detail of Alternative Design for Center Panel.

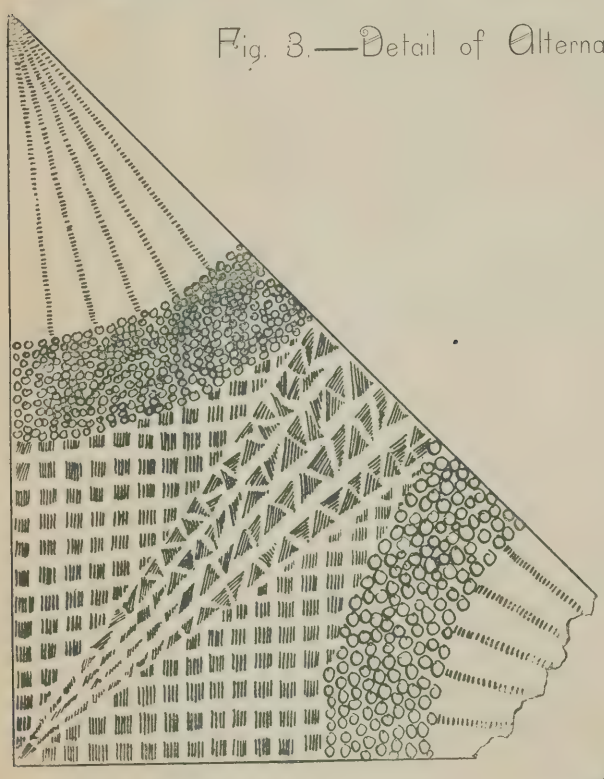


Fig. 4.—Alternative Design for Side Panels.

Rough Cast.

By C. Powell Karr, C. E.

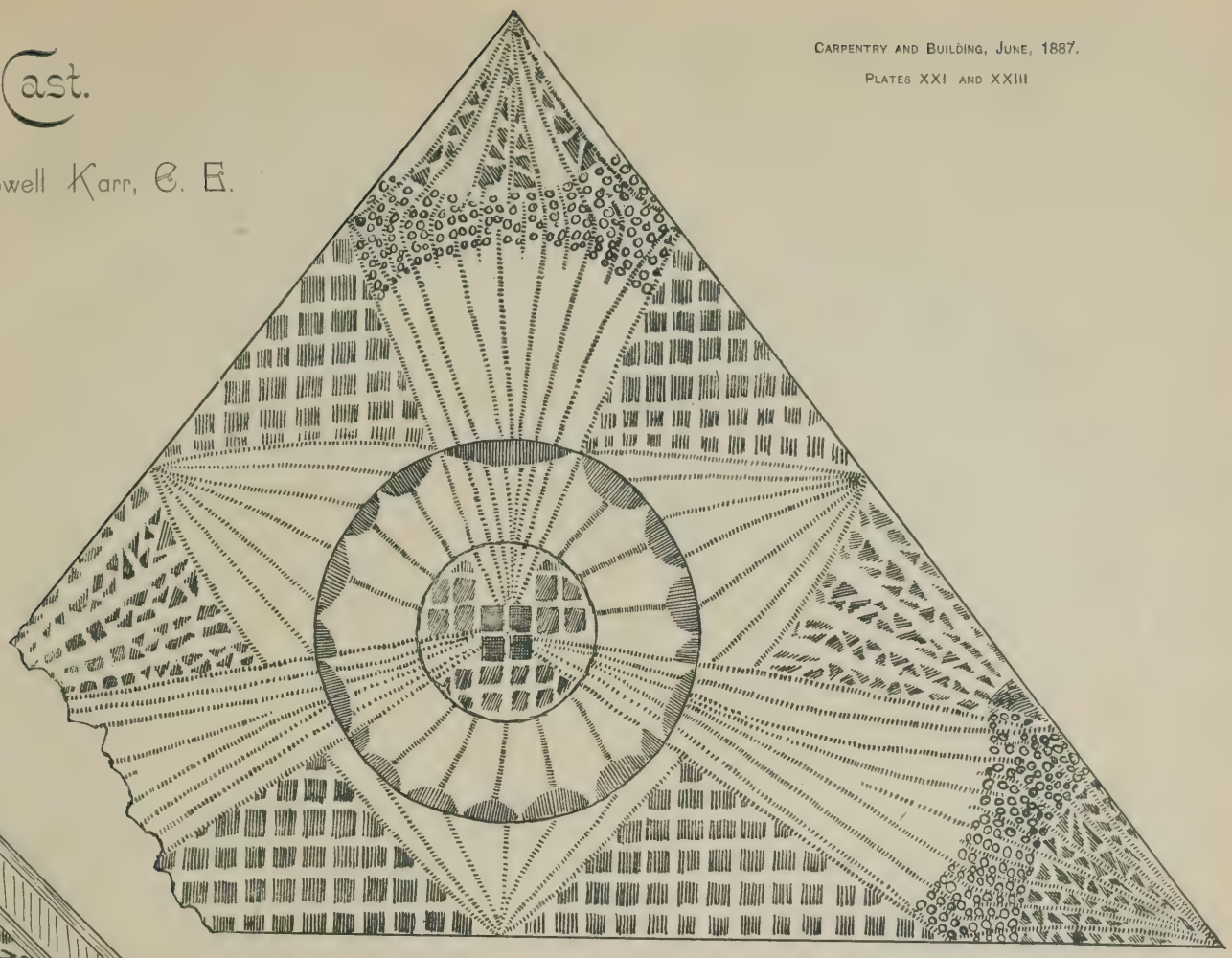


Fig. 2.—Detail of Alternative Design for Top of Gable.

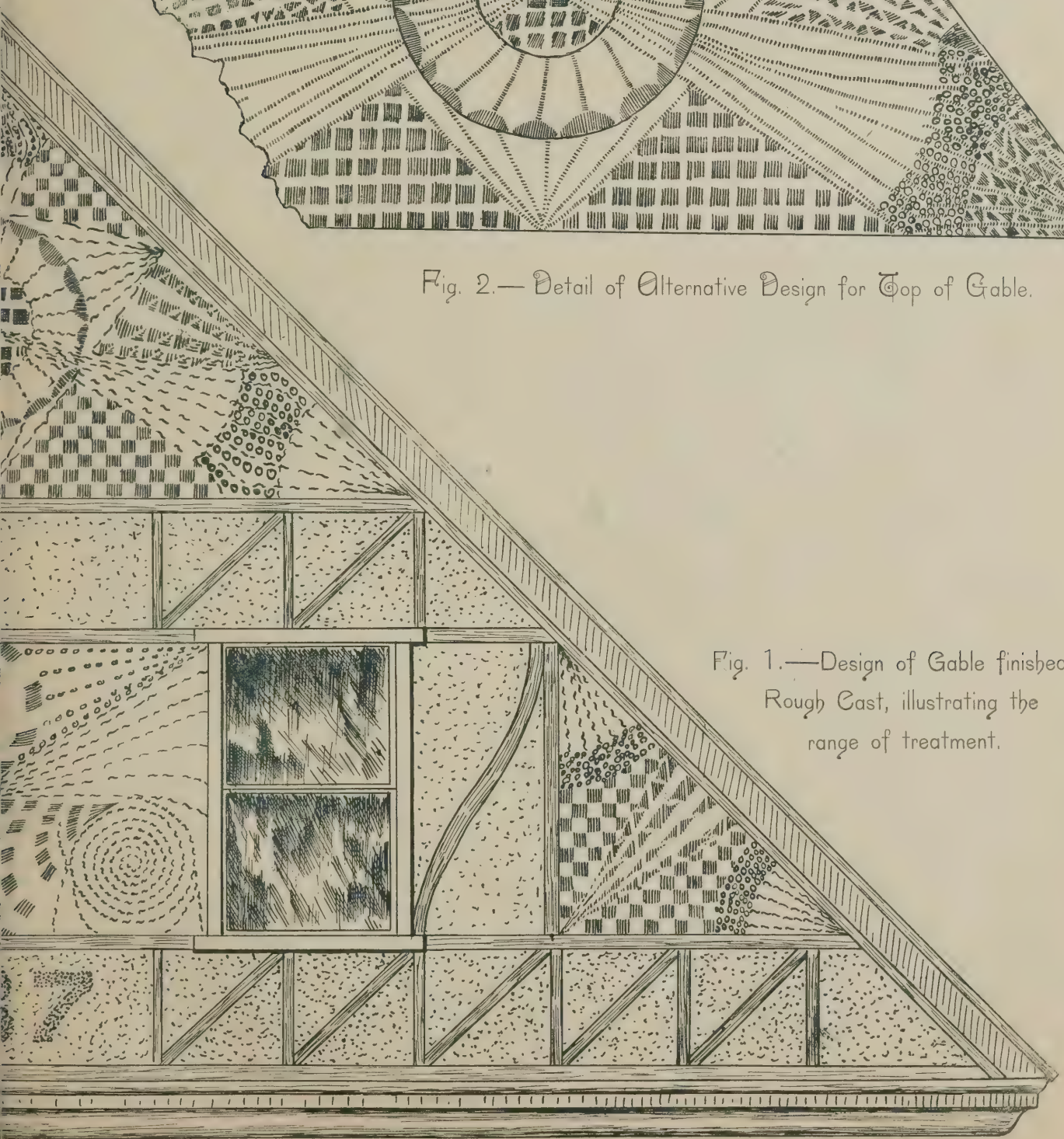


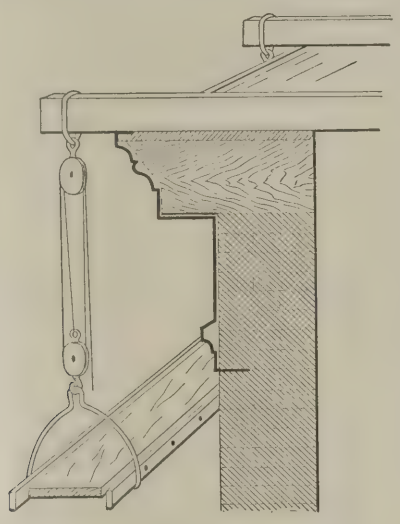
Fig. 1.—Design of Gable finished in Rough Cast, illustrating the range of treatment.

Example of Modern Ornamentation, from Christopher Dresser's New Work.

CORRESPONDENCE.

Putting Up Sheet-Metal Cornices.

From T. C.—It would perhaps be as difficult to give any precise directions for putting up cornices as for any kind of work, yet a consideration of some of the ways may not be devoid of interest to the reader. When convenient to do so, it is probably the best plan to make the cornice



Putting Up Sheet-Metal Cornices.—Fig. 1. *—The Swinging Staging.*

as near complete as possible in the shop, elevate the work into position, and then have it bricked in. In such a case many use iron stays or lookouts, which are pieces of bar iron bent such a shape as to conform to the general outline of the cornice, so it can be fastened by the use of bolts or rivets. In many cases the lookouts can be made of wood, and the cornice nailed to the lookouts before it is placed on the building. Sometimes it is more convenient to have the lookouts placed in the wall when it is built, or the lookouts may

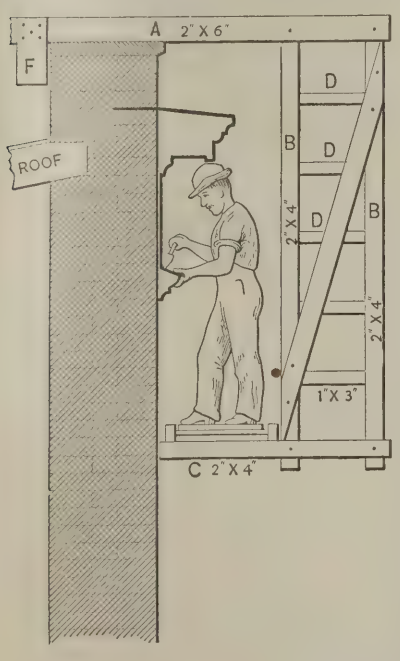


Fig. 2.—*Staging Swung on "Jacks."*

be in position when the job is taken, and if the carpenters or masons have not left their staging, then the question arises how to make one. The swinging staging, Fig. 1, which is a ladder with boards on it, which is elevated to its position by means of two sets of blocks or tackles. This makes a very convenient staging, and is much used in some cities. Those who use a staging but seldom would hardly like to go to the expense of buying one, and would prefer some cheaper way of reaching the elevated position required to do their work. For the benefit of those who have not had much experience in making stagings I will describe a few that I have used under different circumstances, and while there may not be anything wonderful about them, or perhaps useful, by setting the ball a rolling and bringing out the readers' ideas on the subject, much good to the craft may be the result. One job I had to do was on a block of buildings two and three stories high. The lookouts had been placed in position when the building was built, and as all of the stores below were occupied, it would not have been convenient to have used a swinging staging, as the merchants did not want anything to interfere with their awnings, or samples, in front of their stores. They were very emphatic in making that statement. The only course left for me was to work from the roof—of course the work had to be elevated onto the roof from the rear. I had two ladders with sides made of pieces of 2 x 4 pine, that were 3 feet wide; these ladders were made for such work and to be used on another kind of staging. Fig. 2 shows the kind of "jack" that was made for the staging. There were three of these jacks used. All that was required to make a staging 24 feet long was to place the jacks in position over the wall, lower

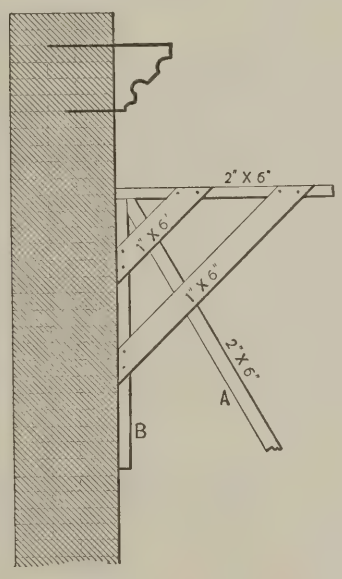


Fig. 3.—*Cheap Scaffold Supported from the Ground.*

the ladders onto the braces *c*, lay on a few boards, and the staging was complete. After this length of cornice had been put up, the ladders were pulled up on the roof and the jacks moved into their next position, and the ladders and boards put back into place again, when the job was done. The painters were very glad to borrow the staging to paint with.

Referring to Fig. 2, A is the main-stay of the device, and was a 2 x 6, B B′ and C were 2 x 4. The brace E is a very important part, as it prevents the lower part from swinging out from the building, and should not be omitted in making such a staging. The cross pieces D and uprights B and B′ make a short ladder, and the pieces A and C can be fastened together with ⅜ bolts, which makes the affair easy to handle. The scantling A can be as long as convenient, as the end not shown in the drawing serves as a balance, and is an advantage, as stays can be nailed from one to the other to make the affair steady.

A cheap staging can be made, as shown by Fig. 3. The 2 x 6 A is the main-stay of the affair, and as it is drawn out from the staging is lowered. It can be made of 2 x 6 lumber, excepting the sides, which can be made of any kinds of boards that may be handy. These boards are to be placed on each side of the 2 x 6, which allows the stage A to occupy any angle desired. A brace can be placed from the center of A to the ground, so as to make it more solid. Under certain circumstances, this style of staging is very convenient, as it can be made of pieces of lumber that may be found about most any building, and is perfectly safe, as

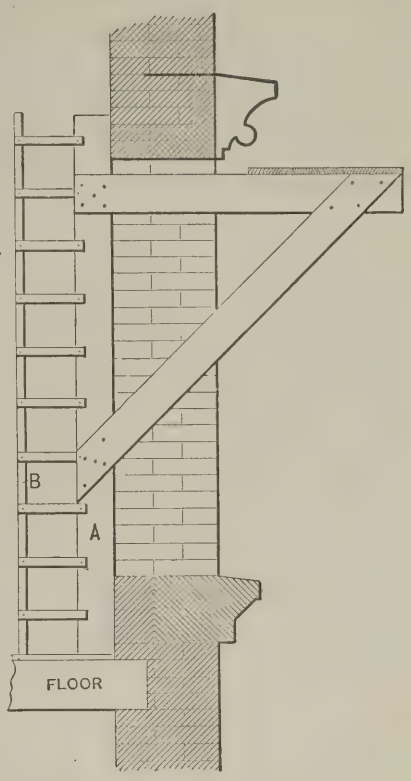


Fig. 4.—*Staging Projected through Window Openings.*

the pressure applied to the top only drives "A" into the ground or "B" against the building.

Fig. 4 shows a style of staging that is very convenient to use when the work to be done can be reached from the top of the window, or in putting up window caps. The drawing only shows one side of the window. The board A can be joined to B, so as to make

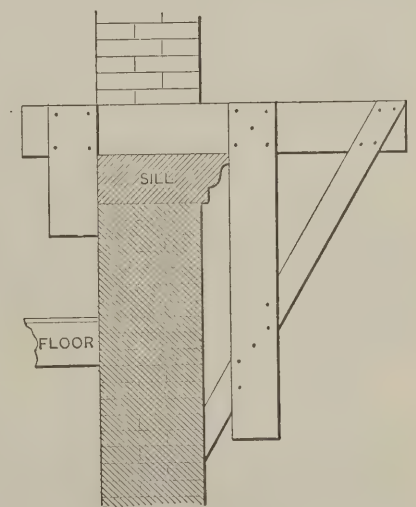


Fig. 5.—*Another Window Staging.*

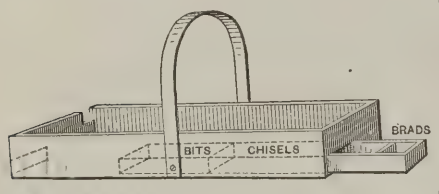
a ladder, or two ladders of suitable length can be used to form the inside part of this staging A, B.

Fig. 5 shows another staging, or foundation for one, as the reader thinks best to call it. This device can be made out of common fencing, and, when put together with wrought nails, is strong enough to hold up any reasonable weight that might be placed upon it, and is very convenient to use when any work is to be done at the bottom part of the window, like driving eye

for iron shutters. It is supposed the reader understands that it is very difficult to represent on paper just the kind of an apparatus that has been used under various circumstances. The various pieces of boards that can be "tacked" on the appliances that are intended to take the place of a balloon in putting up work, would be very difficult to show, and if such an attempt was made, would only make the drawing more confused. In conclusion, I can only say that the reader who has occasion to use any of the appliances here described will have to follow the example set us by our pilgrim fathers when they landed upon Plymouth Rock—make the best of the surrounding circumstances.

Handy Tool Box.

From BRADS, *Wakefield, Mass.*—In a recent number of *Carpentry and Building* your correspondent, "T. B.," asked for a handy tool box. Here it is, the very best one, out. For a jobbing carpenter it is something that he will never be without after once becoming acquainted with. The box is long enough for a long saw, merely by having a notch in one end, and letting the handle hang over. The inside measurements are 26½ x 9¾ inches. The depth is 4 inches, and the drawer at the bottom is 1⅜ inches deep. The drawer extends the whole length of the box, but is only half the width. It is arranged to slide out at either end, and will hold bits, small chisels, &c. A space is partitioned off at one end for holding brads and screws. The handle of the box is made of a piece of smooth hoop,



Handy Tool Box, Described by "Brads."

so arranged as to give a space of 9¾ inches from the arch of the handle to the bottom of the box. With such a handle the box can be carried much easier than by the old way. I will say to my brother "Chips," that if they will try the bail handle they will never regret it. One winter I had a very heavy box of tools to transfer to the shop situated a mile and a half away. I screwed a piece of board to each side of the box for runners, and then, with a bit of rope I drew it over the ice with very little effort.

Perry System of Hand-Railing.

From S. E. D., *New York.*—I would state to the readers of *Carpentry and Building*, reference to Mr. W. E. Perry's system, that where I have found it necessary to join the tangents at different pitches, his method has been of great value to me. I have followed it for upward of 20 years.

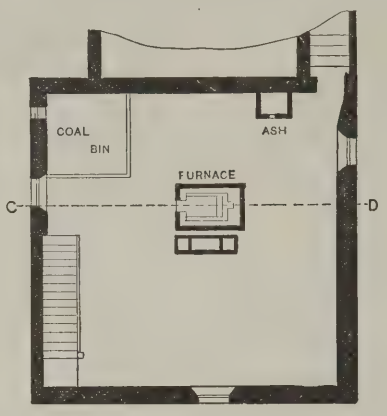
Orthographic Projection.

From P. J. B., *Watertown, Dak.*—Being unable to find a satisfactory solution of the problem in my books on drawing, and having noticed during my eight years' aquaintance with *Carpentry and Building* that you have been both willing and able to help your readers by answering questions of various kinds in a thorough and intelligent manner, I venture to ask if you will oblige me, and perhaps some other self-taught struggler, by presenting in the paper some easy method for finding the shadow in orthographic projection of an object cast on an inclined plane. For instance, that of a chimney on a roof.

Note.—Some of our readers who are studying draftsmanship and applied mathematics, and who have leisure, may be disposed to answer this correspondent. We shall be glad to engrave their sketches.

Hot-Water Heating.

From H. W. C., *Red Wing, Minn.*—I have not seen anything in *Carpentry and Building* of late about hot-water heating, so I will try to stir up the subject again. The sketches I send you show the system I have used in my house during the past winter. I have given the apparatus a fair test and am well satisfied with its operation. There has been no noise of any kind in the pipes, and everything works smoothly. I suppose I have



Hot-Water Heating.—Fig. 1.—Cellar Plan of House.

used altogether about five pails of water since I first filled up the apparatus. The letter C on the floor plans, Figs. 2 and 3, indicates the position of the coils, R the registers, and T, in Fig. 3, the location of the expansion tank, a vertical section of the same being shown in Fig. 5. By the arrangement I have adopted the upper coils are the hottest for, as will be seen by reference to Fig. 5, which is a sectional elevation along the lines C D, E F and G H, in Figs. 1, 2 and 3 respectively, the water passes through them first and then down through the lower coils. Many might object to this arrangement, but my experience has shown that with the hot-air registers in the lower floor a comfortable temperature is maintained throughout the house. The heating

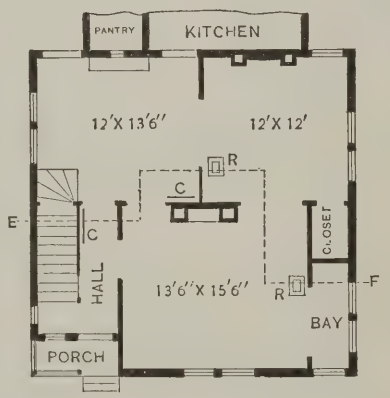


Fig. 2.—Ground Plan of House.

surface in the furnace is just sufficient to warm the upper floor to about 55° or 60°, which is a high enough temperature for bedrooms. I consider hot water in connection with hot air to be an excellent arrangement for heating houses in this country. I have had men visit my house who had had more experience in steam heating than myself express great surprise that my plan worked so well. One of them had said that hot-water heating never could be made a success; now he has changed his mind, and is going to introduce the system into his own house. I find that I can heat the four coils without any more fire than would be needed to heat the air alone. The water-heating surface exposed to the fire is about 4 square feet, and from it I heat about 225 feet of 1-inch pipe. In the hall coil on the first floor there are 53 feet of pipe; dining-room, 75 feet; in the bedroom on second floor, 70 feet, and small room adjoining, 30 feet, besides the connecting pipes, which make in all about 325 feet to heat. The two rooms on the second floor and the hall on the first are heated entirely by the coils, and have been comfortable on the coldest days this winter. The flow and return pipes are of 1½ inch diameter to the point where they branch off, all the rest being 1-inch pipe. The expansion tank pipe is 1 inch in diameter, and connects at the bottom of return pipe, as shown in Fig. 5. I have put valves in both branches of the flow (see Fig. 5), so I can cut off the hot water from either side of the house, as desired. The hot-water coils I have painted with maroon japan, and have gilded the bands and part of the L's and bends. I also send you sketch Fig. 4, showing front and sectional view of night clock, night lamp and ventilator combined, which I use in the bedroom. In the front room on second floor, Fig. 3, it was necessary to widen out the chimney with studding

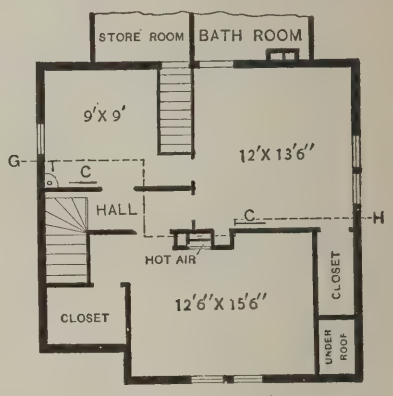


Fig. 3.—Second-Floor Plan of House.

so as to receive a mantel. By so doing I got space sufficient to make a niche in the bedroom on the other side, which I utilized as shown in A and B, Fig. 5, the two lower compartments connecting with the vent flue of the chimney. The niche or cupboard is 6 feet high by 17 inches wide by 14 inches deep, and is closed by three doors paneled. The compartment A has an inner door with a glass clock face in the center. The back of the glass is painted white, so as not to give too bright a light in the sleeping room, a lamp being kept burning in the compartment A behind it. It will be noticed that the clock door is perforated at top and bottom, so as to give proper ventilation.

Note.—From the sketches sent us by our correspondent we have had the accompanying engravings made. As our correspondent

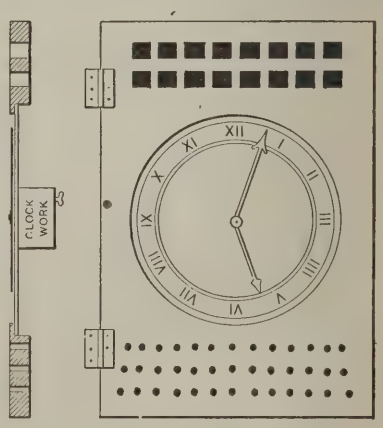


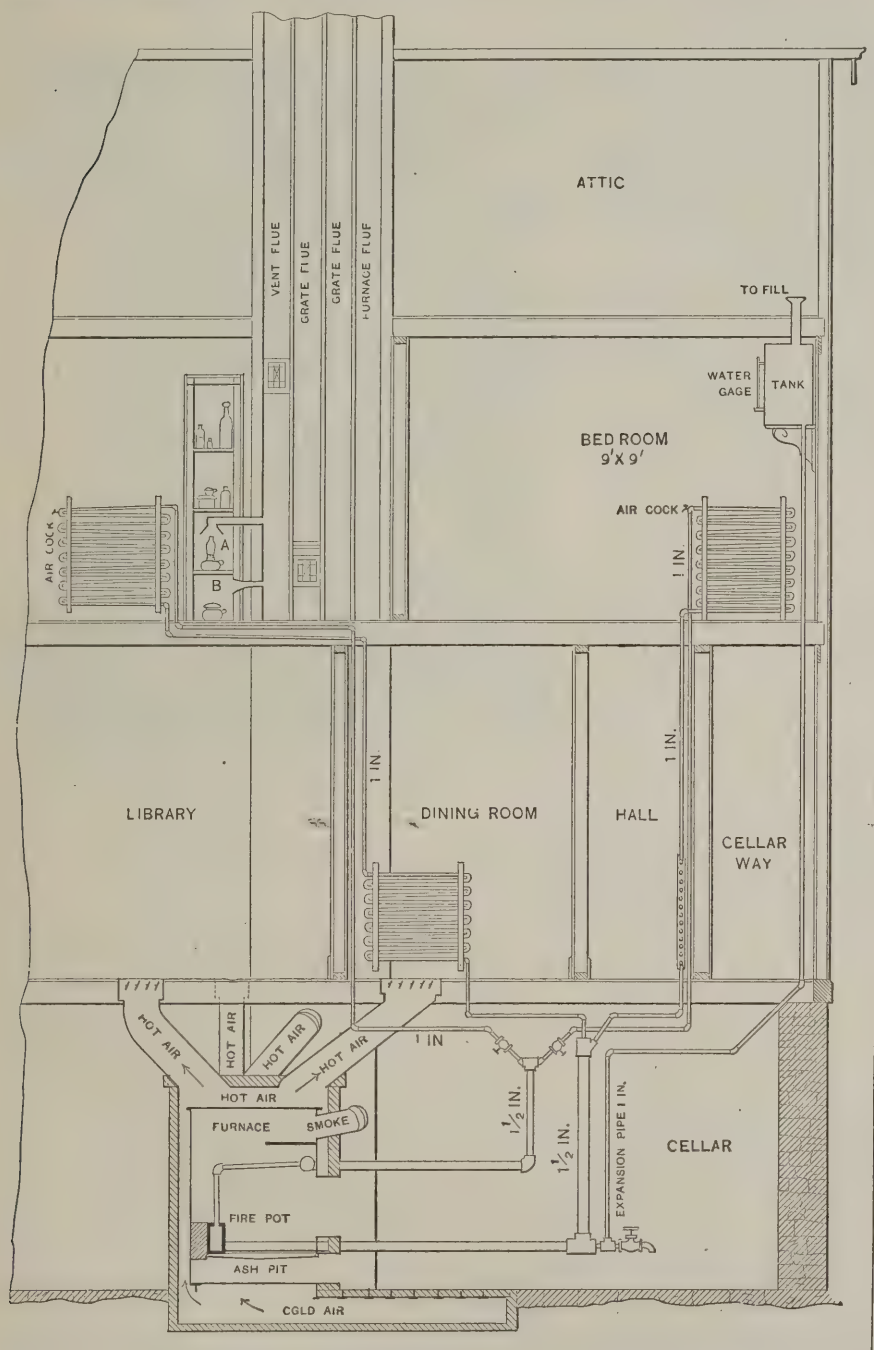
Fig. 4.—Front and Sectional View of Combined Night Clock and Ventilator.

evidently desires to start a discussion about hot-water heating in our columns, and as he writes us that he will be glad to receive suggestions regarding the system which he has described and illustrated, we trust that our readers will not disappoint him. We will be happy to print criticisms favorable and unfavorable on the above plan, or if any of our readers have other systems to illustrate we would be pleased to have them commu-

nicate with us. The relative merits of steam and hot-water heating, as well as of the different systems of the latter, is a subject which, though discussed considerably in the past, is far from being exhausted.

Filing Saws.

From J. R. B., *Ironton, Mo* —A file is nothing but a series of cold chisels, and the hand is the power that drives the chisels into the steel. If our friend "R. M.," who inquires about filing saws, will take a cold chisel and make a cut with it into a piece of steel and examine it closely, he will find it does not cut smoothly, but pulls the steel in the direction of the cut. The more dense the steel, the more lasting it will be. Filing against the face of the teeth closes the cutting edge. The wire edge produced does not, in my estimation, amount to a row of pins. From these general assertions I think your correspondent can draw his own conclusions.



Hot-Water Heating.—Fig. 5.—Sectional Elevation, Showing Arrangement of Pipes and Coils.

From J. P. H., *Fort Huachuca, A. T.*—The answers to "R. M.," of Grand Forks, Dak., which appear in your issue of March, are, I think, exactly what any workman of experience and close observation would have expected. There is, I believe, a literature of saw filing, none of which I have discussion scientifically, but seeing no quotation from any such source will say this much in way of individual experience. That there should be a difference in the shape of teeth, varying in accordance with the respective kinds of work or material to be operated on, must be evident to every mechanic. In filing a cross-cut saw our brother chip in Dakota wants to know which is the correct way to point the file—toward the heel or point of the saw? For some years I pointed it toward the heel; of late years I point it the other way—toward the point. Why? Because, in the first place—remember, now, our file is pointing seen, which no doubt treats the point under toward the heel—I was taught to raise the file handle so that, in connection with the sideways turning of the handle, the back of the tooth would be made thick and the front or cutting edge thin. By filing this way we operate against the front or cutting edge of the tooth in the same way we would in grinding a chisel with the stone turning toward us. Now, by changing ends with the file and lowering the handle instead of raising it to secure the thin front and thick back to the tooth, we get exactly the same shaped tooth as before, but are now working on the principle of turning the grindstone the other way—from us—and, just as in grinding, we have more or less a wire edge on every tooth. The wire edge may appear objectionable to some, but the filing is done more quietly and smoothly, and with more than a proportionate saving of wear on files, so we simply "changed ends," or reversed our file, and consider it a decided improvement on the former method. This would be my answer to the question, but I wish to add, if "R. M." is inexperienced and desires to learn "how to file saws," it need not take him long to so far master the art as to be able to do a better job than many of his fellows. Then let him never refuse to file any saw they ask him to for them. Continue this practice, in connection with close observation, and he need have no fears of not being a good all-round saw-filer.

From S. E. L., *Topeka, Kan.*—I have just been reading the saw-filing correspondence, and I think I will say my little say. I believe the answers published in the March number are both right and wrong. For instance, in filing with the point of the file toward the point of the saw, you put the long bevel on the front edge of the teeth, where it should be, but it leaves a burr on the cutting edge of the teeth. If the saw is very hard, the teeth crumble. In filing with the teeth toward the heel, you get the burr on the right side, but the bevel on the wrong side. My way of saw-filing is to have the point toward the heel and down, so that in pushing the file I push down. As to the elevation and angle of the teeth, I leave that to judgment, for I find that no two saws of different number of points will work equally well under the same treatment.

From J. E. M., *Cookport, Pa.*—In answer to "R. M.," of Grand Forks, Dakota, I would say that the proper way to file a hand cut-off saw is to secure it in a good clamp, with the point of the saw to the left, and then to file the saw complete from one side. By this plan there will be no trouble in keeping the teeth all of one size. I have pursued this plan for a number of years in the best grade of hand saws and find it works well.

From X., *Westfield, Mass.*—I have no doubt that "G. S. B.," of Westfield, is a good, practical mechanic, but I do not think he is quite right with regard to filing saws. I look at saw filing in the same light as I do grinding a plane iron. I think that "G. S. B." would, without doubt, place his plane iron on the grindstone with the stone revolving toward the cutting edge, and would not draw a feather edge out on the cutting edge of the iron. I know I can file a saw, filing toward the handle, much better than I can the other way. I have induced two or three of my fellow craftsmen to try this method, and, as a result, they acknowledge it to be *the* way to file a saw.

From E. Roth & Brother, *New Oxford, Pa.*—Referring to the question recently raised by a correspondent of *Carpentry and Building*, we desire to say that the cut of our saw-filing device contained in our advertisement and the circular which we are extensively mailing to the trade shows in what direction the end of the file should be held in filing a cut-off saw.

From T. B. G., *Council Bluffs, Iowa.*—As regards filing saws, referred to by "R. M.," of Grand Forks, Dakota, I will not attempt to settle his dispute. I will say, however, that I have filed against the front of the teeth and also against the back. I find that filing against the back of the teeth with the point of the file inclining considerably upward gives me decidedly the best results.

From A. L. M., *Lincoln, Neb.*—In looking over the back numbers of *Carpentry and Building* I notice that a great many have written on saw filing, some even attempting to describe the difference between a cut-off and a rib saw. Disston says the saws should be filed from the heel to the point. This, I think, leaves the teeth in the right shape for a cut-off saw, but it leaves the wire edge in front of the teeth. To avoid this is to file from point to heel, holding the file at an angle of about 22½° higher at the heel

than at the point. This produces the same result, except that the wire edge is then on the back of the teeth. This files a point on the tooth instead of filing it off like a majority of carpenters do by holding the heel of the file the lowest. In all cases, I think, the proper way is to file down on the tooth instead of filing up.

Ties For Hollow Brick walls.

From W. W. P., *Rome, N. Y.*—I would like to know where I can find an iron band of good form, practically indestructible in character, and suitable for use in construction of hollow brick walls.

Note.—We are disposed to refer this inquiry to our readers. Our correspondent specifies an iron band, and, at the next breath talks about its being "practically indestructible." Iron itself is far from indestructible; and, treated by any of the processes which are calculated to preserve it, it still fails to merit the name of indestructible. Ties either of wrought or cast iron galvanized, or of the same material Bower-Baarfed. This subject was referred to in the May number of *Carpentry and Building*, both by some of our correspondents and in the form of an article. Possibly as it is there printed, it will give our correspondent a suggestion in the direction in which he is searching.

Cutting Rafters.

From S. J. P., *Baraboo, Wis.*—I have a rule for cutting rafters one-third pitch which may interest the readers of *Carpentry and Building*. Supposing the building to be 18 feet wide. I take half the width of the building, which in this case is 9 feet. I multiply by 2½, and call the answer inches, giving in this case 22½ inches, or 1 foot 10½ inches. I add this to half the width of the building, which gives the length of the rafter, 10 feet 10½ inches. Since this overruns, say $\frac{1}{16}$ inch to the foot, it would make this measurement $\frac{9}{16}$ inch too long. Call this ½ inch, which leaves the rafter 10 feet 10 inches in length. The figures I would make in a problem of this kind would be as follows:

18	9
4½	1 10½
22½	10 ft. 10 ins.

The matter of substracting the ½ inch excessive length in this case, alluded to above, would be done in the head. I shall be glad to know what the readers of the paper think of this method.

Robert Riddel.

From J. F. G., *Toronto, Ont.*—Will you kindly give, in an early number of *Carpentry and Building*, the nationality of Robert Riddel, the author of several works on stairbuilding and other subjects connected with carpentry?

Answer.—We believe that Robert Riddel, by birth and education, was an Englishman. In the latter part of his life, however, he lived in the United States, and for several years before his death he made Philadelphia his home. Some of his works bear an English imprint and some were issued by American publishers. He died in Philadelphia some three or four ysars since.

Question in Bevels.

From N. W. S., *Randolph, N. Y.*—I have a question that I desire to submit to the practical readers of *Carpentry and Building*. Given a roof of any pitch in which occurs a small gable or triangular dormer, the planceer of which miters with the level planceer of the cornice along the eaves of the roof, required, the joint between the raking planceer and the level planceer.

Note.—We have attempted to word our correspondent's inquiry as we understand his requirements. With the understanding that the planceer of the main cornice is horizontal both longitudinally and transversely, and that there is no transverse pitch to the planceer of the cornice, which extends up the gable, we do not see that there is any special framing problem contained in his inquiry. It would be simply a matter of laying the bevel upon the drawing, obtaining the angle represented by the horizontal and raking lines, and subdividing this angle for the line of the cut on the respective pieces. Our correspondent accompanies his inquiry by a diagram, which seems to indicate the above want. We fear, however, that we do not comprehend him.

Vibration of Houses.

From B.—Will you be good enough to give an occasional reader a little information on the following points? Is a house in an exposed elevated situation, that vibrates or shakes in a high wind, unsafe, or is such vibration an evidence of defect in construction? The walls are 13 inches from top to bottom. The house is two stories high, with an attic story in the steep pitched gable. The floor joists are 12 inches in both ground and second floors, and are well anchored to the walls, and the walls are well slushed with mortar. Is it usual for houses to shake in a high wind when they are exposed—that is, ordinary dwelling-houses of 10 to 12 rooms?

Note.—Our correspondent does not say that the building in question is a brick house, but we are allowed that inference from the features of construction he describes. We should suppose, speaking in the most general terms, that there was some defect about the house, if it vibrated or shook violently in storms of an ordinary character. It is well known that frame houses will manifest these symptoms in a remarkable degree without there being any danger of the destruction of the house or of its being thrown from its foundations. Greater stability should be expected from brick houses, and yet we do not see why the house that our correspondent describes should be deficient in stability. Probably, under the circumstances, nothing short of a thorough examination of the premises on the part of a competent builder would settle the question.

REFERRED TO OUR READERS.

Hopper.

From C. W., *Buffalo, N. Y.*—Will some practical reader of *Carpentry and Building* give me the easiest way of building a hopper with capacity of 150 to 200 bushels?

Extension Ladder.

From BRADS, *Wakefield, Mass.*—I want to know if any of the readers of *Carpentry and Building* can instruct me how to make an extension ladder, say 30 feet in length. I want something light, easily carried and yet strong enough to support a workman. There is many a time when to reach a roof, a long, heavy ladder has to be carried quite a distance. I want something that is light and easily managed.

A Nut to Crack.

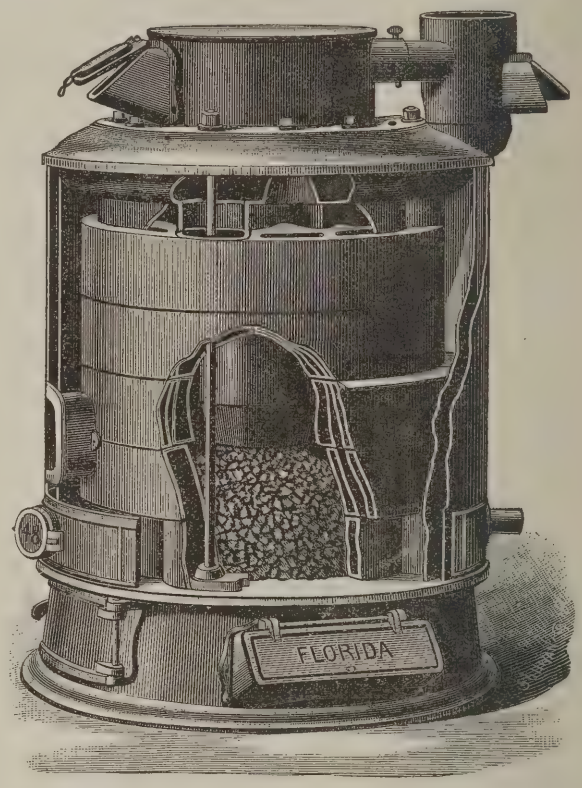
From S. J. P., *Baraboo, Wis.*—A and B each have a stake. B sets his stake in the ground at any place convenient, and so does A. A is provided with a 10-foot pole and a carpenter's square. He does not get out of a space, about his pole, of 10 feet square, and yet is able to tell B how far apart the stakes are. Can any of the readers of *Carpentry and Building* explain how this is done?

Calculating Shingles.

From S. J. H., *McMinnville, Oregon.*—I would like to see in *Carpentry and Building* some correct method by which to calculate shingles. Oregon is a great country for roofing with shingles, and I wish you would ask some of the readers of your paper to send you quick and correct ways to determine the number of shingles that are required to cover roofs of certain sizes.

The Florida Steam Heater.

The Florida Steam Heater, of which we present a broken view in the accompanying cut, is manufactured by the Pierce, Butler & Pierce Mfg. Company, 14, 16 and 18 Clinton street, Syracuse, N. Y. The heater is constructed of three or more hollow cast-iron water sections of circular form, with six oval-shaped return flues and three waterway openings cast in each. These openings in the sections come in line and form the perpendicular return flues of the heater and the water and steam communications between the sections. Through each of the three vertical waterways passes a steel bolt by which the sections are securely bound together. The inner circumference of the water sections are corrugated, which exposes a large heating surface to the fire. Surrounding the sections are two sheet-iron jackets having an air space of 1½ to 2 inches between them, as shown in the cut. The Florida heater is self-feeding, and with a little extra attention in management may be used with wood or soft coal as a surface burner. The magazine passes through the top of the steam dome, the feed door to fuel chamber being at the front edge of steam dome, as shown, and is at convenient hight for handling coal. The fuel chamber is large and delivers coal to the center of the fire. All parts of the Florida heater are made in duplicate, so that repairs can be obtained with little trouble when needed. As a precaution against imperfections every section of the heaters is thoroughly tested under high pressure before leaving the works. To meet the demand for a steam heater for warming public buildings and other large structures, Pierce, Butler & Pierce Mfg. Company have recently put on the market a double heater so arranged that it can be run single or double as the condition of the weather may require. The Florida steam heater is made in various sizes, with fire-pots of from 18 to 30 inches in diameter, and having from 3 to 10 water sections.

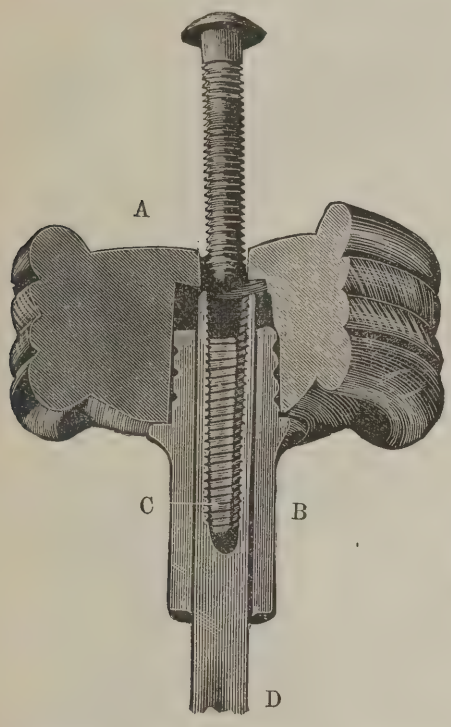


The Florida Steam Heater, Manufactured by Pierce, Butler & Pierce Manufacturing Company.

NOVELTIES.

Hallenbeck's Expanding Spindle Door Knob.

The accompanying illustrations, Nos. 1, 2 and 3, represent a new wood knob patented and manufactured by the Hallenbeck Lock and



Novelties.—Fig. 1.—Hallenbeck's Expanding Spindle Door Knobs.

Knob Co., of Syracuse, N. Y., for whom Messrs. H. H. & C. L. Munger, 142 Lake street, Chicago, are general Western agents. This knob is alluded to as having these advantages: That it can be perfectly adjusted to doors of different thicknesses, and that it has no washer, no rattle, no lost motion

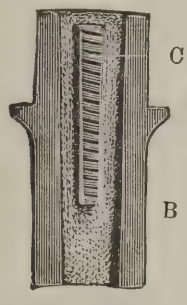


Fig. 2.—Shank.

and no small screws to work loose and drop out. The principle of its mechanism is very simple, and is illustrated in the accompanying cuts. The split spindle D on entering the shank B comes in contact with a tapering wedge, C, which is cast on the inside of the shank, and is expanded by the wedge, filling the tapering spindle hole in the shank. The surface of the wedge has a screw thread cut on it corresponding with a thread cut on the inside edges of the split spindle. When the knob is adjusted on the spindle a screw is inserted through the knob, which

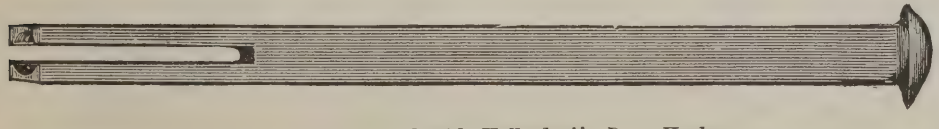


Fig. 3.—Spindle Used with Hallenbeck's Door Knobs.

locks the knob, the shank and the spindle firmly together. It will be observed that as soon as the screw engages with the threads on the shank and spindle they are held firmly, even though the screw be not fully inserted. No other screws are needed, everything being held rigidly by this simple arrangement, and any wear can be taken up by simply readjusting the screw. The knob, it will thus be seen, is very quickly applied. Knobs are furnished by the company in seasoned natural wood to match the interior construction of a house. The rosettes are solid bronze. Knobs are also furnished in bronze and jet.

Universal Wood-Worker.

The Cordesman Machine Company are directing attention to a new Universal wood-worker, which they are just putting on the market, an illustration of which is presented in Fig. 4 of the engravings. As will be gained from casual inspection of the cut, the machine is adapted for a great variety of work. In the enumeration of the uses to which it may be put, the makers say that it will plane out of wind any kind of material, of any width, up to 9 inches, and that the head that is used for this purpose can also be used for squaring, jointing, smoothing, cornering, beveling, chamfering, mitering and tapering. All this can be done without substituting any additional heads and attachments, and, at the same time, the work can be performed in a very perfect manner. They claim that it is an economical machine, because it saves hand-work and avoids the necessity of the presence of half a dozen or more special machines. The column with its framework and wide base is cored out and cast in one piece. Two iron tables with adjustable inclines, in combination with movable sliding frames are provided. These are planed true and fitted with great care in the dove-tailed way in the main frame, but the dove-tailed sliding frames with tables can be drawn from the mandrel for the purpose of changing heads and sizes, and also for inserting saw-board panel, rabbeting irons, &c., between the tables. Both tables can be adjusted independently, either vertically or horizontally, by the hand-wheel placed at the operating end of the machine. In planing warped lumber the tables can also be adjusted simultaneously, either vertically or horizontally, by the hand-wheel, and thereby kept parallel and the edge of the table kept at the proper distance from the cutting circle of the cylinder. For gaining and rabbeting, after both tables are at the same hight, they may be raised or lowered without readjustment to suit the required

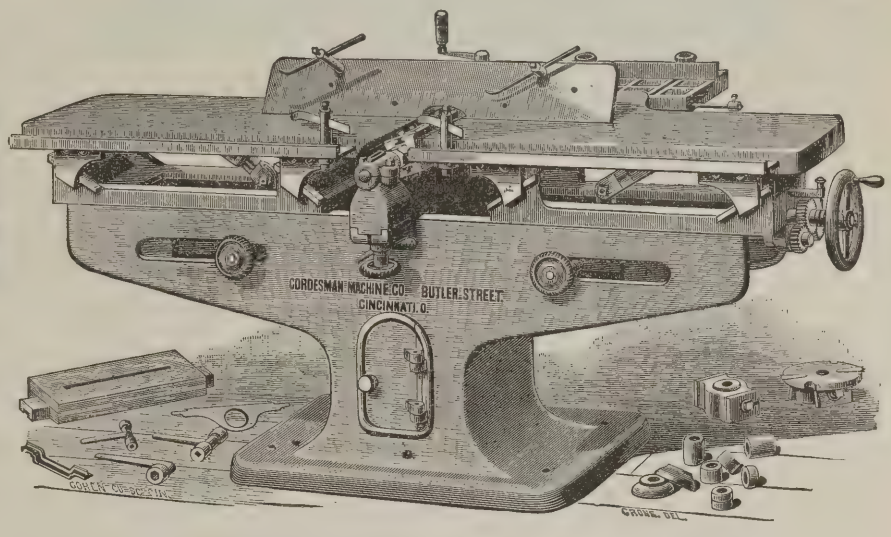


Fig. 4.— Universal Wood Worker, Built by the Cordesman Machine Company.

cut. A circular which the company have recently issued describes other features of the machine, including reference to the arbor, the patented fence with which the machine is supplied, the gaining frame, and also to a boring attachment.

The Kellett Patent Plane Bit.

An improvement on the ordinary plane bit has been invented and is manufactured by Wm. F. Kellett, 304 Dearborn street, Chicago. He constructs the bit in three parts—namely, a supporting plate, a cutting blade and a cap piece or clamp. The supporting plate corresponds with the ordinary plane bit in shape and position, with three exceptions—first, it has no cutting edge; second, it is beveled so as to form a continuous line with the bottom of the plane, and, third, its edge is slightly raised so as to support the end of the cutting blade. The construction of the bit is plainly shown in the accompanying cuts. Fig. 5 shows the tool ready to be put in the plane, with its three parts in proper position for use, while Fig. 6 shows the position of the parts ready for honing. The cutting blade is the only part which is to be sharpened, and it is pointed out that it never needs to be ground, except in case of an accident, such as striking a nail, &c. The supporting plate has a permanent bevel, which is made so designedly to give the bit a rigid backing at the cutting edge, avoiding the vibration at the

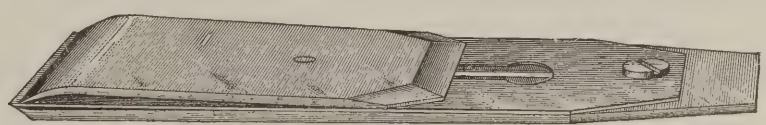


Fig. 5.—Kellett's Plane Bit, Arranged for Use.

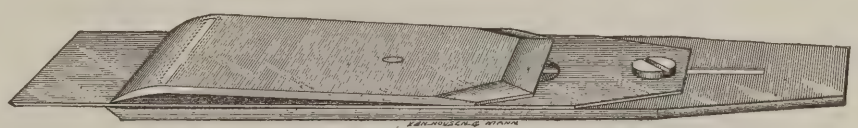
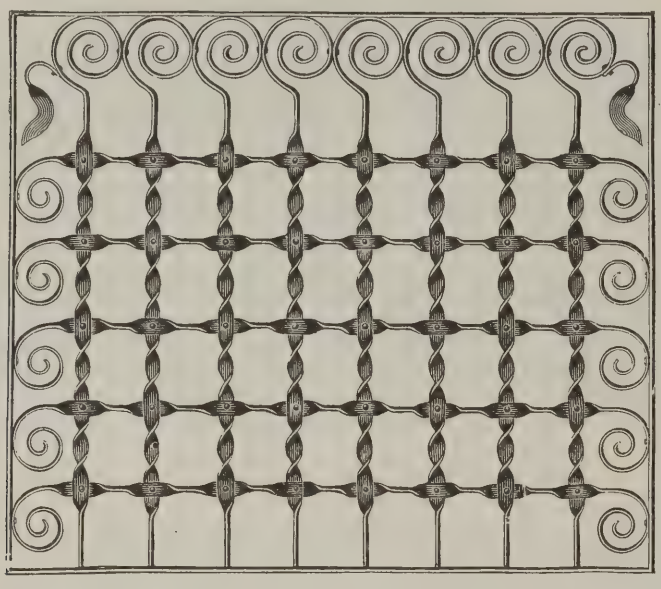


Fig. 6.—Kellett's Plane Bit, Extended for Honing.

point which is inseparable from the ordinary bit ground with a long bevel. These plane bits are so made that they can be inserted in ordinary plane bodies, making it unnecessary to purchase an entirely new tool in order to use them. It is also stated that it has been demonstrated by experience that the thinness of the cutting blade does not prevent its use for all kinds of work, doing equally well for the hardest wood as for soft wood. From the above description it is evident that the idea of this invention is to adapt for use in a plane a very thin bit highly tempered and so supported as to have all the advantages of the conventional thick bit in general use. A circular which the maker issues contains, in addition to the cuts presented herewith, illustrations of the



Novelties.—Fig. 7.—Wrought-Iron Window Guard, Manufactured by J. E. Bolles & Co, Detroit.

position of the bit in a plane stock, and also diagrams showing how the same may be placed in a way to be entirely wrong.

Wrought-Iron Window Guard.

The extensive use of wrought iron at the present day for window guards, screens, grills, crestings and other similar work

Fig. 8.—Another Design of Wrought-Iron Window Guard, Manufactured by J. E. Bolles & Co., Detroit.

lends interest to every design which manufacturers put forth. We show in Figs. 7 and 8 some all-wrought iron window guards manufactured a short time since for the residence of S. B. Dixon, of Detroit, Mich., by J. E. Bolles & Co. The designs were prepared by Messrs. Mason & Rice, architects, of the same city. The work is very thoroughly shown in the engravings, and there is little to be said in the way of explanation or description of the designs. A transom guard was supplied at the same time to match the general design of the window guard, which is shown in the second illustration.

Spring Steel Board Rules.

The Lufkin Rule Company, Cleveland, Ohio, are making the nickel plated spring steel board rules which are illustrated in Fig. 9 of the engravings. This article has been put on the market to meet the demand for a board rule that is practically indestructible, yet not clumsy to handle. It is described as made of the best English steel, and is warranted to be of the finest spring temper. The weight of the steel rule does not exceed that of the wooden one, as it is not necessary to make it as wide or thick. The head is of steel, and is alluded to as very strong, being the same style of head that the com pany put on their best rules. The handle is made to conform to the shape of the hand. With reference to the figures and divisions, the company state that they use a plain block figure, and make the divisions with a good sized diamond-shaped dot, the points of which give the exact measurement. The diamond is referred to as preferable to a line, being more distinguishable, and not weakening the rule. The figures and divisions are black and easily read. In order to prevent rusting, the rule is nickel-plated and coated with a fine lacquer, which is baked on to the steel and forms an impervious coating. But before nickel-plating, a dead surface is given to the steel which takes away the glare or reflection when used in the sunlight. These rules are made in 2½, 3 and 3½ feet.

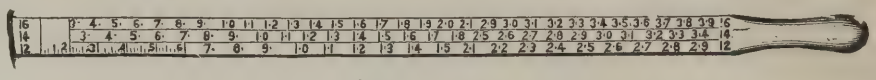


Fig. 9.—Spring Steel Board Rules.

Stearns's Silent Saw Vises.

E. C. Stearns & Co., Syracuse, N. Y., whose general Western agents are H. H. & C. L. Munger, Chicago, Ill., have recently made an improvement in their saw vises, which are known to the trade. The improvement consists in the addition of a third jaw to the vise. This jaw is faced with solid rubber, and presses against the side of the saw, under and parallel with the metal jaws, effectually preventing vibration, and thus greatly reducing the noise while a saw is being filed. It is brought into position after the saw has been gripped by the metal jaws, the same lever operating them having a cam which operates the rubber jaw when the lever is pushed home. The new vise is made in two styles. The one shown in Fig. 10, being made for permanent attachment to a bench or frame, and the one shown in Fig. 11, being provided with a clamp to fasten on the bench. The latter has also a patent ball

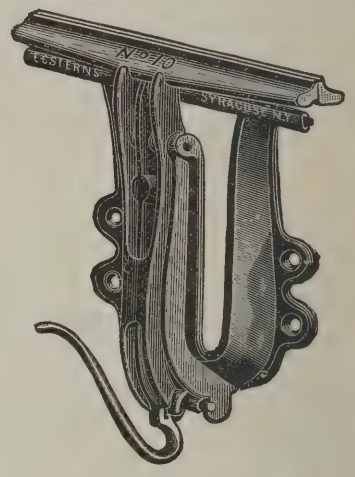


Fig. 10.—Silent Saw Vise.

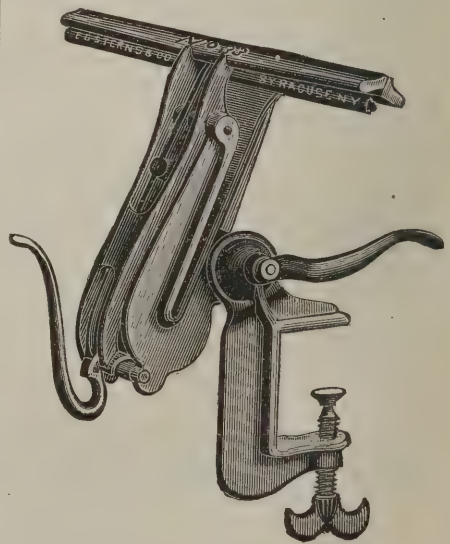
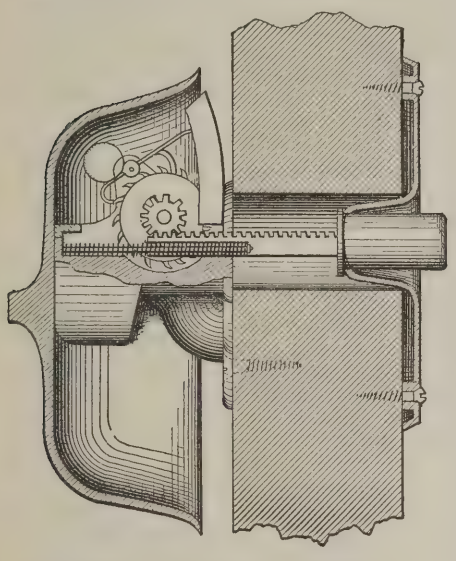


Fig. 11.—Silent Saw Vise with Clamp.

and socket joint of ingenious construction, which enables an operator to set the vise at any angle desired. The utility of this feature is alluded to as affording a great convenience in filing saw teeth to a particular bevel.

Pierce's Electic Bells.

The Peck, Stow & Wilcox Company, Chambers street, New York City, are putting on the market a novelty in the form of door bells which cannot fail to interest our readers. They have been given the somewhat peculiar name of "Electic" bells. The term, it will be noticed, resembles "electric," and it is only on second glance that the difference is noted. And the bells in their operation as nearly resemble electric bells as the name resembles that term. The name, we believe, has been coined for use in this case, and seems to be appropriate in view of the resemblance. The bell operates by means of a push button, very much the the same as an electric bell. Instead of



Novelties.—Fig. 12.—The Electic Bell.

wires, battery, &c., the bell is rung by a hammer put in motion by a rack and pinion movement in combination with an ordinary clock escapement. The button is forced outward, after being pushed in, by means of a coiled spring, which is put back of it and immediately in line with it. To the casual user of the bell, it is the same as an electric bell, and yet more effective, especially when the batteries of the electric bell are partially used up. And there is the marked advantage of being free of batteries, wires and the other attendant evils of an electric system. The sound upon the bell is a succession of rapid blows, similar, so far as the ear is concerned, to an electric bell. By features of construction, which have been carefully worked out, the bell can be located several feet away from the button, or it can be put immediately adjacent to the button, as indicated in the sectional view which we present herewith. The engraving, Fig. 12, shows the principle upon which the device works, so that the article can be fully understood. Another feature to which the makers direct attention is the fact that the buttons are prepared in a peculiar way so as to be luminous at night. Accordingly, there is no difficulty in finding the button in the dark.

Palmer's Adjustable Sheave for Sliding Doors.

We illustrate herewith a new sliding door sheave that is now being put on the market by Palmer Mfg. Company, Troy, N. Y. It is of that class of devices for sliding doors that are mortised into the bottom and run on a track laid on the floor. Fig. 14 represents the common or axle pattern inserted in its proper position in a door, and Fig. 13 the anti-friction style detached. Both are of the same general construction, and consist of a shell for carrying the wheel and a sliding plate, which is secured by screws at the bottom of the mortise. T-shaped tenons project at right angles from points near the ends of the plate, and have beveled shoulders to fit the beveled slotted slides on the top ends of the shell. The mortise is made somewhat longer than the shell, which admits of a lateral movement of the sheave, imparted to it by means of a screw connecting it with the edge of the door. It will be seen that, by drawing the sheave toward the edge, the door will be raised, and by an opposite movement it will be lowered. The head of the screws in the edges of the doors are covered by nicely finished edge plates, which by means of their parts being interchangeable the same plates match either flat or astragal edge doors. The manufacturers call attention to the following features of excellence: First, that it saves the builder more than its entire cost; second, that it saves the house-owner much unnecessary expense and the occupant much annoyance; third, that it can be applied in one-fourth the time required to apply any other; fourth, that all parts are accessible and easily removed; fifth, that it keeps the doors from warping; sixth, that it strengthens the door, its own weight always drawing the parts together; seventh, that they can be placed so near the edges of the doors that tilting and derailment are avoided. They also call attention to the fact that they are made strong enough for the heaviest doors, are finished in the best manner, and are very low in price.

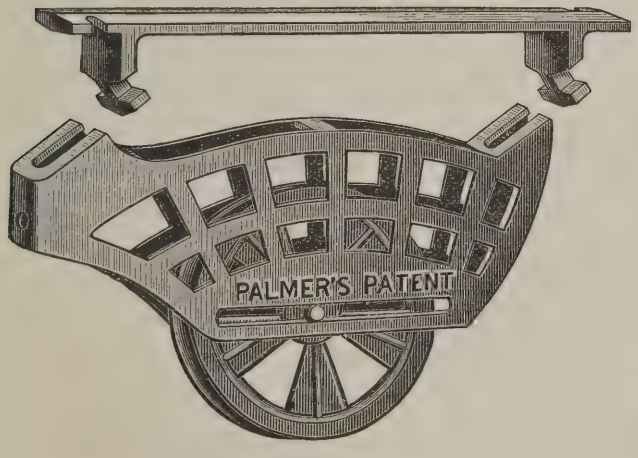


Fig. 13.—Palmer's Anti-Friction Sheave.

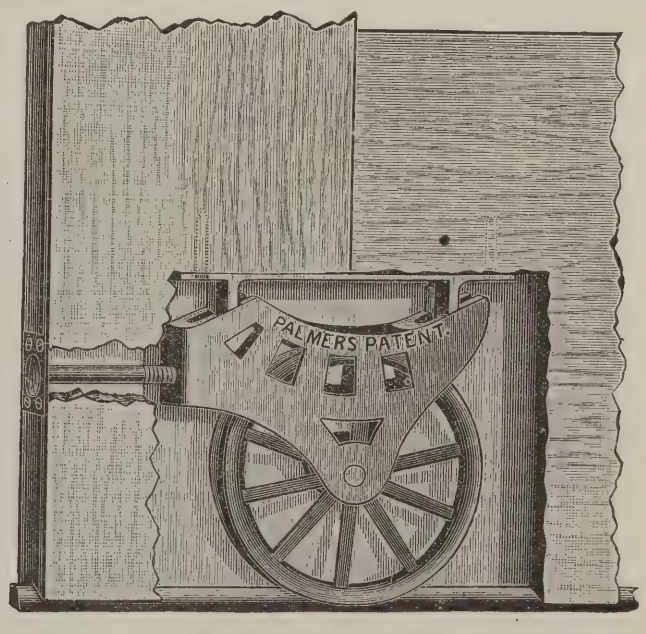


Fig. 14.—Palmer's Adjustable Sheave, Axle Pattern.

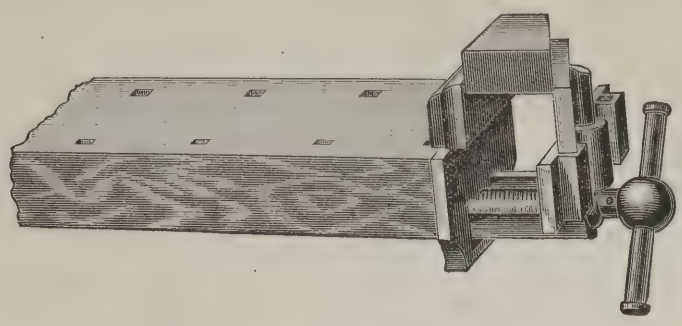


Fig. 15.—Champion Vise for Wood Workers.

New Wood-Worker's Vise.

Amos Fales, of Rockfall, Conn., who is already known to our readers as the inventor of the Fales Variable Bench-Plane and other useful tools, is putting a new wood-worker's vise upon the market, which is being manufactured by the Little Giant Mfg. Company, of New Haven, Conn. Fig. 15 of the engravings shows the vise as it would appear attached to a bench. From the illustration it will be noticed that the vise is provided with extension jaws above the bench, which are quickly attached and removed as may be required. The stationary jaw is provided with two socket-holes, into which the extension jaw is adjusted. The sliding jaw is provided with three socket-holes, one of which is circular, thus accommodating swivel jaws; the other two have rigid jaws. The socket-holes for the stationary side of the vise may extend from the head to the foot of the bench, and also across the head of the bench, as indicated in the cut. With this provision the rigid jaw can be placed in any position across the head of the bench; also in any position from the foot of the bench. This description indicates the usefulness of this vise for many kinds of work that constantly arise. The vise is of iron, with a wood handle provided with leather knobs. The handle drops on the screw-head with an elastic, noiseless bound, and the knobs, as the inventor assures us, will never drive off, as wood knobs sometimes do. The main jaws of the device, which are 10 inches long, will hold stuff $\frac{1}{16}$-inch in thickness firmly at one end, without closing up at the other end.

A Journeyman's Experience With Dry Rot.

In the past we have published several articles relating to dry rot, both with reference to the nature of the fungus growth commonly called by this name, and, also, as to means that may be resorted to for preventing its growth. In a recent issue of the London *Building News* there is published an article giving the experience of a journeyman with the dry rot difficulty. What he has to say is likely to be of interest to many among our readers, although the buildings to which he refers are not altogether like those in this country, and some of the conditions named are different from those commonly prevailing here. At the close of the article, it will be noticed that the writer draws certain conclusions which indicate that he is an intelligent and very close observer:

Having of late years had experience with the destructive and seemingly increasing, though not yet satisfactorily explained, fungi class known in the building trade as dry-rot, I think that a few words anent the subject will not be amiss. My first practical acquaintance with dry-rot and its deteriorating work was at a village church of moderate antiquity. It had a few years previously been thoroughly restored, and there were a few small air-ventilating grates round the building just above the ground. The part that engaged my special attention was curtained off for the use of the choir, as a vestry, close by the organ, and I was told that the floor which was laid at the restoration had been completely taken up 12 months previous to my visit, entirely rotted by the perniciousness and insatiableness of dry rot, and was relaid with pitch pine, those in power seeming to think that pitch pine was a universal panacea against dry or any other rot. As I saw it (after taking up the linoleum with which the floor was covered), the fungus had eaten through 1¼ inches pitch pine boards in 12 months, and still appeared flourishing in all its luxuriance; the worst places were cut out and replaced with new boards, the linoleum replaced as before, and the reckoning day staved off for a time. Circumstances took me away from the place, and I have not had the opportunity of inquiring after the progress of events since. This I may say, that the church is situated on a high hill, and its surroundings are such one would think unfavorable to dry-rot.

My next acquaintance with dry-rot was in a building the very reverse of the above—a flour mill in a large town in a valley, with the canal on one side of the building, and a goit or sluice passing under the mill to turn the water-wheel. The floor of the basement was, and is, of wood and below the level of the canal, so that dampness pervades the atmosphere and ventilation is difficult and expensive—in fact, there was no ventilation to the basement floor, the infected part. Probably the mistake is in having a wood floor at all, and the most effective remedy I think would be to take the whole basement floor up and relay with concrete; as it is, the floor has to have periodical attacks made upon it by the joiner, first in one place and then in another. I had the privilege or misfortune to make one of these attacks, taking up a considerable portion and relaying with new timber, having the joists and the under side of the floor boards coated with a good coat of tar. Two years afterward I took up the adjoining part, and so had the opportunity of examining the tarred part, and with satisfaction noted that the dry-rot did not seem as yet to have touched it.

My next experience was at the post office, built 12 or 14 years ago. The building itself was designed and built under an architect of professional status and good practice; here again it was the basement floor. The building itself has a well-drained, flagged area all around, the flagged bottom being below the basement floor, and the upper part covered with cast-iron grates flush with causeway; iron ventilating grates led from this area to underneath the floor, the floor being carried on joists on sleeper walls. Here I found dry rot flourishing, and, after taking part of the floor up, found water to the depth of 3 or 4 inches; upon tracing this, I found it was fed by a small cistern fixed to supply the kitchen range boiler, the cistern being fed by a ball tap which was out of gear, and had probably been so since the completion of the building; the leakage was, of course, stopped, the water pumped out, some of the soil taken out to give greater air space underneath the joists, and the worst parts of the floor taken up (which, by the bye, was just where the water had stood; the ground rose slightly from here, and where there was no water the wood did not seem infected), and replaced with new wood, the wood, sleeper walls and soil being well soaked and washed with copperas or blue vitriol (cupric sulphate) dissolved in boiling water. This was little more than 12 months ago, so I have not yet had the opportunity of taking notes.

The next sphere of action was on the opposite side of the road to the post office, in a large warehouse; here, again, the evil was in the basement floor, which was below the road proper; but a small back yard sloped from the road to the level of the floor for the convenience of wagons; this inclined yard butted against the warehouse wall with no area, dry drain, or air space intervening. The worst part of the floor was the part adjoining this yard; indeed, the opposite side of the floor which adjoined other rooms was quite sound, the rot seeming to have commenced at the joist ends which butted against the wall bounded by the yard, and to have traveled along them and the underside of the floor boards six or seven feet. The room had a wood dado fixed round it, the part fixed to the wall in question being completely infected and eaten through in several parts; in fact, the space between the dado and the wall was quite choked up with fungus, it having apparently traveled up the dado, and from there to the window bottoms, linings, and even into the window sill, and from thence into the soil of the yard, exhibiting white minute roots between the joints of the yard sets; one of the windows had a round white bulbous protuberance growing outside something like a mushroom. This floor had no ventilation, and after taking out all imperfect parts, some of the soil, and the sleeper walls, the ground, &c., were well washed with a solution of blue vitriol, with which also the new wood was impregnated, the joists being carried on brick piers without wall plates, instead of the old sleeper walls with wall plates. An air-drain was made between the yard and the wall covered with iron grates, grated openings being made from this to underneath the floor. My attention was next directed to the basement floor of another room in the same building; this had an open area adjoining the external walls, but no ventilation of any kind to the floor; the proceedings in this were somewhat similar to the last.

The next attacking point upon this thriving fungus was in the boxing-pit of the gymnasium of an athletic club; the attack was not made with the gloves, but by pulling the whole floor up, which was several feet below the road, and had no ventilation; the proceedings here were somewhat similar to the last, except, there being a fireplace, an air-draft was led from underneath the floor to feed the fire and to create a draft.

My next acquaintance with the enemy was in a small dwelling-house which has only been built two or three years. The house stands by itself on the side of a hill facing a wood, the hill being partially excavated for the building. The kitchen is at the back, and has a cellar underneath. At the front is a small parlor, but no cellarage, the floor of this room resting on sleeper walls, with a moderate depth of space between the floor and the soil, and with a small air grate leading to the front. The sides are parpoint walls (and will be the party-walls should houses be erected adjoining), having the soil of the hill butting against them; but on one side there is an open passage leading from front to back, between the hill and the house proper; but the other side had nothing (excepting a fireplace) but parpoint wall between the soil and the floor, and it was here the mischief commenced—between the fireplace and the kitchen wall. The rot had first attacked the wall-plate in this corner, which crumbled away between the finger and thumb; from thence it travaled to the joist, floorboards, and up the back of the plinth, infecting the whole of the woodwork between the fireplace and the kitchen wall, and from the side wall to about a yard into the room. The other or front side of the fireplace was not touched at all, and here I may say that the ground outside sloped to below the joists. The fungus in the infected corner appeared to flourish on the soil under the floor; but it had not traveled beyond the area of the infected part of the floor, The soil was full of minute white roots wherever the fungus grew. The infected part was taken out, the ground, wall and timber carefully washed and soaked with a strong solution of blue vitriol, and an air drain constructed outside.

In conclusion, I may say my obaervations are these: That the material first infected seems to be Baltic deals, either red or white; that, after the fungus germs have got established, they do not appear particular what sort or class of timber they attack; that they appear very partial to basement floors and damp, ill-ventilated places; that soil which is of an argillaceous character seems to encourage their growth, and a radius of one mile will include all of the above cases.

The Black Process for Duplicating Drawings.

All well-equipped manufacturing establishments in which draftsmen are employed, are using some means of duplicating drawings. Among the large concerns in the cornice business, what is known as the blue print process is very generally used. A new black process, which has advantages over the blue process, is the invention of M. Poitevin, and is described as being simple, easy and inexpensive, while the prints are ink-black, and are made from drawings or positives and negatives.

Sensitizing Solution.—Dissolve separately.

1. Gum arabic,		13 drams.
Water,	17 ounces	
2. Tartaric acid,		13 drams.
Water,	6 ounces	6 drams.
3. Persulphite of iron,		8 drams.
Water,	6 ounces	6 drams.

The third solution is poured into the second, well agitated, and then these two solutions united are added to the first, continually stirring. When the mixture is complete add slowly, still stirring, 100cc. (3 fluid-ounces 3 drams) of liquid acid perchloride of iron at 45° Beaumé. Filter into a bottle, and keep away from the light. It keeps well for a very long time.

Sensitizing the Paper.—Here especially it becomes necessary to select a paper that is very strong, well sized, and as little porous as possible. By means of a large brush or sponge apply the sensitizing liquid very equally in very thin and smooth coats; then dry as rapidly as possible with heat, without exceeding, however, a temperature of 55° C. (131° F.). The paper should dry in obscurity, and be kept away from light and dampness; notwithstanding all these precautions, it does not keep well long, and if it is desired to act with some certainty it is better to have a stock to last only a fortnight. Freshly prepared, it is better than a few days afterward. It should be of a yellow color.

Printing.—The tracing, made with very black ink, is placed in the printing-frame, the drawing in direct contact with the plate; then place over it the sensitized paper, the prepared side in contact with the back of the tracing. There is do necessity to make use of photometric bands, as the progress of insolation is sufficiently seen on the sensitized paper during the exposure. From yellow that it was it should become perfectly white in the clear portions—that is to say, upon which there is no drawing of the transfer or positive cliché that is to be copied. This is ascertained by raising from time to time the shutter of the frame. The exposure lasts from 10 to 12 minutes in the sun; in summer less, in winter more. When the exposure is ended remove the print from the frame, and it should show a yellow drawing

upon a white ground. If in the sensitizing bath a few cubic centimeters of a rather highly concentrated solution of sulphocyanide of potassium have been added, this bath becomes blood-red, and colors the paper the same; in this case the print also whitens during exposure, but then the image, instead of being yellow, is red, on a white ground. The substance, however, is, if we may so speak, inert, or without any other action; it is very fugitive, and even disappears in a short time in obscurity; it has no other use, therefore, than to render the drawing or the image more visible after exposure.

Developing the Prints.—When the print has been sufficiently exposed it is taken from the pressure-frame and floated for a minute in the following solution, so that the side upon which is the image should alone be in contact with the surface of the liquid' avoiding air bubbles between the two surfaces. Otherwise defects would be found in the print. To ascertain this, raise in succession the four corners. The developing bath is composed as follows:

Gallic acid (or tannin)	31-46 grains
Oxalic acid	1¼ grains
Water	34 ounces

In this bath the orange, yellow or red lines are changed into gallate or tannate of iron, and form, consequently, a veritable black writing ink as permanent as it. The print is then plunged into ordinary water, well rinsed, dried, and the print is now finished. The violet-black lines become darker in drying, but unfortunately the ground, which appears of a pure white, often acquires in drying a light violet tint. For prints with half tones this is of no importance, but for the reproduction of plans, for example, it is very objectionable. By this process we have the satisfaction of obtaining a drawing in black lines similar to the original, and in most cases this is sufficient.

The Principles of Co-operation.

As the fundamental principles of co-operation the following rules are laid down by F. H. Giddings, in the *Co-operative News of America:*

1. Co-operation should equitably distribute the profits of trade and industry among consumers, workers and capitalists.

2. Secure to workers an increasing control over the conditions under which they perform their labor.

3. Economize resources and increase the total wealth to be divided.

4. Distributive co-operation distributes the gains of trade among consumers but does not help workers in their earning capacity.

5. Profit sharing, or the division of portion of the productive or distributive industry among workers, in addition to their wages, and on the basis of labor performed, aids workers in their earning capacity, but does not, of itself, admit them to participation in management.

6. Productive co-operation, organized by workingmen, secures participation in both management and profits, but it lacks the resources, adaptiveness and directive ability of the capitalist employer.

7. Perfect co-operation, therefore, requires the division of gross profit into the three parts: A dividend on purchases, a dividend on labor, a dividend on capital.

8. The conversion of dividends on purchases and labor into shares of capital stock as the basis of increasing control sharing by workers and consumers.

9. Limitation of the amount of capital stock that any one individual or party may own, and of the voting power of capital; or, where this is impossible:

10. A division of control, some matters being left to the control of a majority of shares of capital; others, to the decision of a majority of persons.

11. A liberal and elastic system of federation, to prevent duplication and waste.

12. These requirements must be made mandatory by the law under which co-operative societies are incorporated, or they will be overriden by personal ambition and capitalistic interests within the society before a majority of its members have learned experimentally to understand true co-operation and to appreciate its advantages.

The Irish Joiner.

The following fragment, in which some very neat plays upon words occur, was published some time since in one of our English exchanges. It is suggestive, and some of the rhymsters among our readers may be able to add verses in the same strain:

I'm a *joiner* by trade, and *O'Chisel's* my name,
From the sod to make *shavings* and money I came,
But myself I was never consarning
'Bout the lessons of schools,
For my own chest of tools,
And my shop were a college of larning.
For by *cutting*, contriving,
And *boring* and *driving*,
Each larned profession gains bread,
Oh, they're safe to succeed
If they only take heed
To *strike the right nail on the head.*
Whack, whack, hub bub loo, gra ma chrée,
All the dons in the nation are joiners like me.

The *lawyers*, like *carpenters*, work on a bench,
And their trade's just the same as my own to an inch;
For clients whenever they dive in it,
Soon find their cash fail,
For the *law's a big nail.*
And the '*turneys* are *hammers* for driving it.
For by cutting, &c.

The *doctor* a big *chest of tools* carried out,
And *cuts*, *saws* and *hacks* his poor patients about,
Just as I would a *plank* or a scantling:
And it's all one to him,
If he lops off a limb,
Or takes out an old tooth or a young bantling.
For by cutting, &c.

Then each Sunday at church by the *parson* we're tould,
By *line*, *square* and *compass* our actions to mould.
And at *joining* himself the right sort is;
Fer he pins *man* and *wife*
Together for life,
Just as firm as a *tenant* and *mortise.*
So by cutting, &c.

And the *heroes* that sarved in our army and ships,
When they're fighting our battles are all *brother-chips*;
So entirely our trades are according.
For with tools of sharp steel,
Soldiers cut a great deal,
And the *tars* are nate workmen at *boarding.*
So by cutting, &c.

TRADE NOTES.

We are indebted to Mesker & Brother, of St. Louis, for copies of the fourth edition of their catalogue of architectural sheet-metal work. The pamphlet is oblong, and almost as large as a page of *Carpentry and Building.* The designs included are in many instances ¼ inch to the foot, and cover a wide range of window caps, cornices, pediments, &c., as well as entire store fronts. With reference to the latter class of work, the interesting statement appears in the catalogue that the firm have manufactured and put up over 800 galvanized-iron fronts, of from two to five stories in hight, varying in design from the simplest to very elaborate. Directions for ordering galvanized-iron house fronts are presented, and are in such shape as to enable the builder to be intelligent in work of this kind. Building columns are illustrated, also paneled ceilings. Skylights are briefly treated near the close of the work, and gutters with molded fronts are illustrated next to the last page.

A patent has recently been granted to Oliver L. Gardner, of Brooklyn, N. Y., relating to interior wall finish. The novelty consists in the construction, arrangement and adaptation of parts. The material used is what is commonly known as "straw lumber." This consists of a board or sheet of homogeneous material, formed of several sheets of paper cemented and united by heat and pressure. With suitable sheets of this article, the inventor proposes to form the walls and ceilings of buildings, or to decorate the walls already formed in such places. To this end, features of construction are pointed out which enable the work to be performed in a minimum of time, while the character of the material is such that it can be finished in imitation of different woods. The wall to be finished is subdivided into panels, and a base plate. The inventor cuts from the main panels a form smaller than the base panel; out of the base panel in turn he cuts a section smaller than the cap panel. The base panel or band is applied to the base plate, and the cap panel to the base panel, thus producing, in effect, raised or molded work of whatever configuration that may be desired. The piece cut out of the base plate serves for a cap panel, and the piece of the base panel serves for a separate and smaller series. The effect of the solid relief produced by panels constructed in this way is said to be as sharp and bold as the finest hand carving. The panels may be hand painted or embossed; further, they may be secured so as to be removable, allowing persons to fit up an apartment by this means, and take their handiwork with them on removing to another residence. The face of the entire work may be frescoed, painted, grained or varnished in every manner, the same as natural wood. The inventor points out that a fresh coat of paint at any time will make the work as good as new. In another patent granted to the same inventor, an alternative means of decoration is shown, in which the decoration is an integral part of the straw lumber. The construction is adapted to the peculiar material in hand, and the designs presented in illustration of the idea indicate that an apartment fitted up in this manner can be made very attractive indeed.

The Bradley-Currier Company, Limited, who are at present located at the corner of Hudson and Spring streets, New York City, direct attention in their card, which appears in this issue, to a line of wood mantels; also a large variety of slate mantels, together with doors, windows, blinds, moldings, &c., which they carry in stock. They solicit correspondence with the trade at large.

Hot Water Heating seems to be rapidly growing in favor as its advantages become known. The Gurney Hot-Water Heater Company, of which H. M. Johnson, No. 140 Centre street, New York, is the general selling agent, direct attention to the special form of heater known as the "Gurney" as being well adapted to meet the demand for apparatus of this kind in private dwellings, offices and public buildings. In their card, which appears in another part of this number, the points of advantage are enumerated.

The recently issued catalogue of Gail & Bumiller, 181 South Clinton street, Chicago, describes and illustrates surface planers, bed planers, band sawing machines, molders, shapers, jointers, gauge lathes, &c. Among other machines there is shown a new universal wood-worker, which may be described as being set on a solid column, cast in one piece, having two iron tables with adjustable inclines in combination with movable sliding frames.

The Millers Falls Company, whose branch office for a long time has been located on Chambers street, just below Broadway, New York, have recently removed to No. 93 Reade street, where they have better office facilities and a larger showroom for the accommodation of their numerous specialties and the reception of customers.

J. E. Bolles & Co., of Detroit, Mich., inform us that they are making arrangements to largely increase their facilities of manufacture. A new factory, 60 x 100 feet in size, is about to be built, and this, in connection with the building, 70 x 110 feet, now upon the same property, will give them ample facilities for all the trade that they can obtain. We understand that the new structure will be built about August 1.

The Seneca Falls Mfg. Company, 209 Water street, Seneca Falls, N. Y., offer to the trade a catalogue, free, of their foot-power machinery, and also propose sending

machines on trial. Their Acme Circular Saw is illustrated in their card in another part of this issue.

J. C. HENDERSON & Co , No. 195 River street, Troy, N. Y., write us under recent date that they will be glad to correspond with builders, architects and persons contemplating house building, on the question of heating and ventilation. They say that any one wishing information with regard to heating buildings by hot-air circulation, hot water or steam, or by combination of any two of these systems, or all three, together with the best modes of ventilation, will serve their own interests by opening correspondence with them.

THE CHARACTERISTIC TESTIMONIAL secured by the Stanley Rule and Level Company for Stanley's beading, rabbet and ceiling plane is worded as follows: "A first class mechanic's pet." This, as we learn by the company's advertisement, which appears in another column, comes from a Southern carpenter.

J. REYNOLDS & SON, Thirteenth and Filbert streets, Philadelphia, are directing attention to the steel air-tight heaters which they manufacture, and of which five sizes brick-set and two sizes portable are upon the market. These heaters are fitted with the special shaking and clinker grinding grate which this company make. Circulars and catalogues are given to all applicants.

THE CATALOGUE issued by the Progress Engine and Machine Works, Summerfield, Md., contains illustrations of the Kirkwood wind engine, together with diagrams of towers and suggestions of arrangements under varying conditions. A number of certificates are published from those who have used the apparatus satisfactorily, and there is appended an extended catalogue of pumps, tanks and fittings. The same company issue a catalogue of emery grinders, and a circular of an automatic cut-off engine which they manufacture.

THE CORTRIGHT METAL ROOFING COMPANY, of Philadelphia, in directing attention to their peculiar system of roofing, mention in their card in another part of this issue that their work is based upon an entirely new principle, the like of which was never before attempted. They also assert that perfect success has attended their efforts. The laying of the shingles or tile begins at the comb and finishes at the eaves. The principles upon which their roofing is constructed are also applied to ridging valleys and flanging.

A DAINTY ADVERTISING SOUVENIR recently issued by Berry Brothers, manufacturers of varnishes and japans, Detroit, Mich., with offices in all the large cities, consists of three very thin leaves of celluloid, 2 x 3 inches in size, fastened together at one corner by a brass eyelet. On the face of one of the outside leaves is printed a most excellent steel-plate portrait of Frances Cleveland, the lady of the White House. On the last page is the card of the firm putting out this novelty. The leaves are adapted for memoranda, and as a pocket article it is one of the choicest we have ever seen in the way of an advertising novelty.

ACOUSTIC CONSTRUCTION is an important consideration in the planning of new buildings. Many instances might be cited where all the rules of acoustics have been violated, and accordingly the audience-chamber has become a mere place of rattling echoes, rather than a comfortable room in which to listen to a sermon or oration. C. Powell Karr, in a card printed in another part of this issue, directs the attention of the public to the fact that he makes a specialty of acoustic construction, both in the planning of new buildings and the overhauling of old ones.

A RESPIRATOR which possesses some interesting features is being placed upon the market by the Morley Respirator Company, of East Saginaw, Mich. It is especially intended for use where emery wheels are employed, such as lead works, blast furnaces, planing mills, foundries, machine shops and the like. The respirator consists of an elastic rubber mouth-piece, held in position by an elastic rubber band. The air enters through openings in the front of the device and passes through a dampened sponge, held in place by a flange on the inside. When the air is discharged from the lungs it escapes through an opening made in the upper part of the respirator, where there is a mica valve, which opens very readily, and is so constructed as to prevent the entrance of air through it.

SCOTT & COMPANY, No. 75 East Front street, Cincinnati, Ohio, issue a special circular illustrating and describing their self-capping iron roofing. A cut showing a portion of a roof covered with this material is presented, and also an illustration of a sheet as it is shipped, is shown. The same circular directs attention to metallic roofing paint for iron and tin roofs, of which this company make a specialty.

THE AUTO COPYIST COMPANY, whose system for duplicating manuscripts and drawings has been before our readers for some months past, have recently removed from No. 3 Thomas street to No. 166 William street, New York. The company give specimens of its work to all applicants.

IN THEIR ADVERTISEMENT in this issue of *Carpentry and Building* Chas. A. Strelinger & Co., of Detroit, Mich., present a list of handy tools, and specially illustrate what they describe as DeVoe's Square Attachment. This attachment may also be applied to a 2 foot rule, which converts the latter into a beam compass, while in the former it establishes gauge points, adapting the square to such purposes as marking the bevels of rafters, &c., without the necessity of carefully watching the inch marks with the eye each time.

H. W. JOHNS' ASBESTOS LIQUID PAINTS

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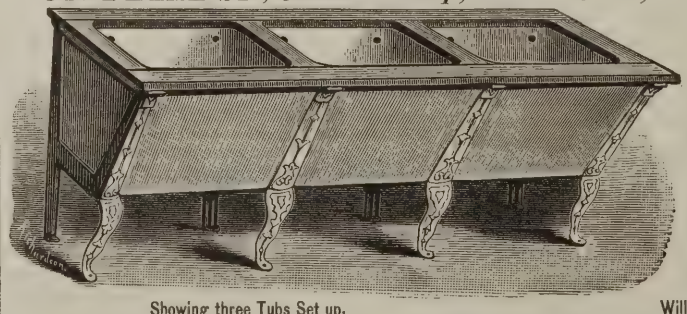

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CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE EDITOR of *Carpentry and Building* will be very glad to correspond with architects, designers and draftsmen having studies that would be desirable for publication in this journal. The special want is for houses of moderate cost, in good style and adapted to be built by carpenters of average opportunities; also for odd details, such as bay-windows, porches, doors, roof trimmings, &c. Summer houses, arbors, trellises, fences, stables, pavilions and similar architectural work that builders are required to construct, particularly in the holiday season of the year or preparatory thereto, are always in order. Any one having on hand something of this kind, or who is intending to get up designs that would seem to meet the requirements above expressed, are invited to make such facts known to the Editor.

FROM figures which have recently been published, showing the statistics of the building business for the spring of 1887, it appears that a very much larger business is in progress in New York just now than ever before. The figures of buildings erected the past three years during the period from January to May are as follows: 1885, 1484 buildings; 1886, 1963; 1887, 2517. Taking the estimated cost in round figures, the sums are respectively $21,000,000, $30,000,000 and $40,000,000. Notwithstanding the fact that in the aggregate the building business is so good, there is manifest in some portions of the city a falling off. There is certainly a temporary halt in the rush to build on the west side of the Park. More costly buildings, however, are going up, and on the east side of the Park there is an increase in business in that section of the city. The district above the Park shows the growth which its area invites.

EVEN the most casual observer in New York must have been struck by the great increase in immigration indicated by the troops of Italians and others which have become an almost daily incident of metropolitan street life. Their numbers have grown very rapidly during the current year, April alone, according to official statistics, being credited with the arrival of 73,107 men, women and children, while in the first four months of 1887 the number of immigrants was 137,406 against 90,089 in 1886. The movement is one which a good many earnest citizens view with some alarm, and the feeling is growing that unchecked immigration is by no means an unmixed blessing. In nearly every case the violence and lawlessness during the period of unrest which is still prevalent are directly traceable to that foreign element in our population which has not been assimilated. Let it be conceded that the un-American anarchist and socialist element is not nearly so numerous as its boisterous manifestations might lead a superficial observer to believe, still the fact remains that no mean accessions are coming to them every year from abroad, and that they have some influence upon a large part of our population, which, though born in this country, is still largely under the influence of foreign traditions. We do not believe that these elements are the source of any lasting danger, but they have already been and are likely to be very troublesome indeed. Such considerations have weight with many thinking men, and may be skillfully used from other motives by those who are eager to restrict immigration. It is difficult to see how additional safeguards can be devised to keep out paupers or men bound under contract. Our laws cover the ground quite well, but it is evident from the cases which crop up from time to time that they are not so stringently carried out as they should be. The danger of precipitating further restrictive legislation would be that it probably would do much injury by keeping from our shores the most desirable immigrants for the sake of holding back the dangerous elements.

IN dealing with the question, some consideration should be given to the nationality and the occupations of the immigrants, concerning which the returns of the Bureau of Statistics furnish much material. During the year ending June, 1886, the total number of immigrants was 334,203, of whom 66,188 were under 15 years of age, while 232,118, or 145,340 males and 86,778 females, were between the ages of 15 and 40; only 35,897—that is, 21,184 males and 14,713 females were 40 years old and upward. Out of the 334,203 immigrants, not less than 328,528 came from Europe, and it is with them which we must principally deal. Leaving aside the children and those over 40 it is shown that Great Britain contributes the largest number of immigrants, 47,447 males and 34,568 females, the great majority of whom may be considered a very desirable class. The same is true of the Swedes, Norwegians and Danes, and in a lesser degree of the German immigrants, who alone number 53,186. The Hungarians, Poles and Italians, generally speaking, are not an element which is welcomed. So far as the occupation of immigrants is concerned, the Bureau of Statistics furnishes very full information. The total of what is classed as skilled occupations aggregates 31,159 males between 15 and 40 years, and 4108 above that age, and 1229 females. This represents less than one-fourth of the total number of immigrants in their full manhood.

THE Bureau of Statistics classifies under "miscellaneous occupations" 117,546 males, of whom 101,967 were between the ages of 15 and 40 years. Of this number not less than 86,807 men were common laborers, of whom 76,860 were under 40 years of age, or more than half of the whole number of men who arrived in this country, while only 20,528, or less than 1 in 7, were farmers. This should dispel many erroneous ideas, only too prevalent, that it is our farming and not our industrial occupation which receive the greater share of the accession from abroad. It is common labor which is principally attracted to us. The mechanics and skilled artisans, whose pay is relatively much higher in this country than in the countries from which our immigrants principally come, have therefore least to fear from the competition of foreigners. It is the common labor, which, compared to other methods of livelihood, is least tempting here, that sees annually the greatest accessions to its ranks. We believe that herein lies one of the most potent reasons for the deep discontent which prevails among those who have no other occupation to depend upon than common labor. The foreigners who come within this group generally, too, have not enough intelligence to rise. Very few of them acquire property by industry and frugality, or assimilate readily with our own people. It is this class, and particularly the Hungarians, Poles and Italians, who constitute a heavy percentage of the whole, whose invasion of our country in large numbers is the leading drawback of the great immigration now going on.

THE SATURDAY half-holiday law, which went into effect in the State of New York a short time since, bids fair to work important changes in business habits. Saturday, at best, has been a short day for all business operations for a long time past, and by legalizing the half-holiday feature, it is still further abbreviated. The tendency is to suspend business altogether on Saturday, and evidence of this is to be discovered on every side. The Building Exchange recently voted to do no business hereafter at all on Saturday. In this connection it may be remarked that different railroads leading from the city to the country are arranging special excursion trains for the accomodation of their patrons who desire to spend Saturday afternoon and Sunday in the country. The special trains leave New York shortly after noon and return Sunday evening.

A RECENT occurrence in a Western city illustrates the difficulties which beset the path of American workingmen. An establishment employing a considerable number of operatives was compelled by the lack of demand for its special product to suspend operations for an indefinite time. The workmen were informed that it would probably be a long time before the works were started, and in the meantime it would be well for them to seek employment elsewhere. As their trade was one requiring considerable skill and experience, and similar establishments in many other parts of the country were still running, it might be supposed that many, if not all of them, could secure employment. Perhaps they could have done so under some circumstances, but they found one very great obstacle in their way—namely, they were non-union workmen, while the establishments in operation were controlled by a trade union of the most aggressive and uncompromising character. Moreover, the unfortunate workmen to whom

we allude had but a few months before accepted employment as non-union men after a long struggle between their employers and the union, which had embittered the latter not only against these works, but against the men who dared to enter their service. In fighting the union this particular establishment secured a position of independence which was regarded as eminently desirable for many reasons, and numerous other concerns employing large numbers of workmen possibly wished themselves equally free from the domination of mill committees and district delegates.

THE victorious employers doubtless gave little heed to the future of the men who were willing to renounce the union for present employment. The possibility of a stoppage of work and the consequences to non-union workingmen were perhaps very little, if at all, thought of. The immediate aim of the one party to the controversy was control of wages, working hours and manufacturing operations, while the absorbing desire of the other party was to secure work, even if ties to other men in the same line of mechanical occupation had to be severed. It is argued that this fact imposes upon non-union employers a greater responsibility, since it puts the men into a comparatively helpless position—dependent upon the prosperity of the one concern for which they are working. While this is true, and while it may in individual cases, like the one cited, be the cause of much hardship, it should not be forgotten that the non union workmen enjoy advantages not to be underrated. They are free from the payment of dues and assessments, are not fettered by laws which put the good workman on a par with his inferiors in skill and industry. They are not liable to be forced into idleness without a moment's notice because a fellow-craftsman, thousands of miles away, has, or believes he has, a grievance. To hold aloof from a trades union means no mean order of self-reliance on the part of a workman, and a corps of such men are likely in the long run to prove a great advantage to any manufacturer, and through aiding to his success minimize the danger of occurrences like that alluded to. Employers of non-union labor should fully recognize the risk their men are taking. It is a phase of the trades-union question which specially appeals for settlement on humanitarian grounds. As business men they will find it good policy to do all within their power to make the risk as small as possible.

THE proposition to build a new cathedral in New York under the auspices of the Episcopalians has led several of the daily papers to discuss the question of the architecture of the building, and, more particularly, of the architect to be employed upon the structure. The cathedral, it is proposed, shall be a majestic and beautiful structure, in which the citizens of New York of all denominations shall take a pride, and which shall encourage home art from its simplest and most mechanical form to the highest flight of genius. The ideal is certainly worth trying for, but is one that will not be easily reached. The cost of the proposed building, exclusive of site, has been variously estimated, one figure being $10,000,000. If erected, the structure will, including the site, cost as much as this, if not more. One of our contemporaries refers to the two cathedrals already in existence in and near New York—the Catholic cathedral on Fifth avenue and the Protestant cathedral, at Garden City, L. I. Concerning them the question is raised, What have they to teach concerning the practical carrying out of the purpose that ecclesiastical buildings on which large sums of money are spent shall encourage the native arts? The Protestant cathedral at Garden City, it is pointed out, is in imitation of English church architecture, and was built to a greater or less extent under the charge of an English architect. Indifferent statuary by an indifferent sculptor has been placed about it. The glass is declared to be English, and the general effect completely foreign. The Catholic cathedral on Fifth auenue, while built by an American, is characterized as a repetition, on a smaller scale, of a European original, and where that original is departed from the departure is declared mean and tasteless. The stained glass is largely French, and is of dubious artistic value. After discussing the subject in this way, our contemporary asks what assurance there is, what likelihood exists, that the Protestant cathedral, which is to be four times the size of St. Patrick's and to cover two city blocks, will vary in its record from these two forerunners? The delicate problem presents itself as to which of the able architects of the land is capable of so great a task. The writer to whom we have referred asserts that any architect might hesitate to accept so enormous a responsibility as the designing and erection of a cathedral costing so much money. The worthier he were the less would he push himself forward, but those who are sure to make an artistic failure of a task so difficult will always be ready enough to try their hand upon it. He concludes as follows: "People are very tired of seeing post offices, exchanges, opera houses and churches committed to the mercy of architects without a glimmer of genius." The progress of the scheme and the choice of an architect will be watched with much interest.

ATTENTION is not infrequently directed to the question as to how far the clearing of woodlands affects local climate and water courses. Forestry associations have done much to awaken interest in this matter, and their efforts are likely to result in very general benefit to the country at large. The influence of shade and ornamental trees according to number, kind and proximity upon the sanitary condition of a dwelling house and its immediate grounds are, however, questions which rarely come to disturb the suburban or country resident. The subject is nevertheless one of pressing importance, and it were well if more attention were given to it. Mr. Charles Roberts, writing in the London *Lancet* on trees from a sanitary aspect, gives a number of useful hints and wise observations. Of course, he speaks regarding English conditions, and some of his remarks are not therefore applicable to this country, but the main body of the article is not restricted in its teaching to any climate or country. We reproduce in condensed form such part of the article as seems to us of special interest. Trees of all kinds exercise a cooling and moistening influence on the atmosphere and soil in which they grow. This cooling is due to the evaporation by the leaves of water drawn from the subsoil, and to the exclusion of the sun's rays from the ground, trees themselves being little susceptible of receiving and radiating heat. On the other hand, the leaves and branches restrain the evaporation of the water which reaches the ground, the evaporation under a mass of foliage in a forest being nearly four times less than in the open. But a fact that also is of decided importance, though little attention is given to it, is the interference with the circulation of air by trees. It is said "a lovely spot embowered in trees embraced by hills is usually characterized by a damp, misty, cold and stagnant atmosphere," a condition of climate obviously unfavorable to health. Country houses are too often shut in by trees, though the effect from a sanitary point of view is about as bad as that due to defective drainage or impure water supply. People are educated in some measure to the danger arising from the latter two evils; but that trees have any effect on health one way or another is a subject upon which very little thought is expended.

A HOUSE hidden away by trees is too often in a reservoir of damp, stagnant air, as may be shown with a wet and dry bulb thermometer, and where the conditions are anything but favorable to health. It is strange to what an extent the lateral circulation of air is interfered with by hedges, and where the sun is excluded there are no vertical currents, either. The following excellent suggestions are given about planting and removing trees: "A tree should not stand so near a house that, if it were to fall, it would fall on the house—or, in other words, the root should be as far from the house as the hight of the tree. Belts of trees may be planted on the north and east aspects of houses, but on the east side the trees should not be so near nor so high as to keep the morning sun from the bedroom windows in the shorter days of the year. On the south and west aspects of houses isolated trees only should be permitted, so that there may be free access of the sunshine and the west winds to the house and grounds." A great deal also depends upon what kind of trees are planted near a house, Mr. Roberts recommending that they be chosen in the following order: Conifers, birch, acacia, beech, oak, elm, lime and poplar. Pine trees are the best of all trees for this purpose. Acacias, oaks and birches are late to burst into leaf, and therefore allow the ground to be warmed by the sun's rays in the early spring. The elm, lime and chestnut are the least desirable kinds of trees to plant near houses, although they are the most common. They come into leaf early and cast their leaves early, so that they exclude the spring sun and do not afford much shade in the hot autumn months, when it is most required. A point often lost sight of in putting out trees around a house is that ultimately they will grow to be large. The rule given by Mr. Roberts that the hight of trees should be the measure of the distance from a house at which they are planted, if applied literally, would make it necessary to transplant the trees every year. The distance should be equal to their mature hight, and a few quick-growing trees nearer the house would do temporary duty until the others were grown.

THE PLATES.

In Plate XXV we present the elevations and floor plans of a house designed by one of the student readers of this journal. In another part of this issue will be found the author's description of his effort.

Plate XXVI contains the illustrations of another installment of the serial on overmantels, which has been running in our columns for some months past.

In plate XXVII we illustrate some panels that were used in new chancel stalls for the restoration of an English church, some time since. The designer is Mr. T. G. Jackson. Only two designs are shown, but in the work in question the designs were varied and were beautifully executed. They are of interest to those who have similar work in hand. In the upper part of Plate XXVII we show some designs for wrought or cast iron anchors for the walls of brick buildings. Two of these are alphabetic in character, and show how monograms might be worked to advantage in designs of this style.

In Plate XXVIII we show a staircase design, including newel post, baluster, handrail and certain constructive features. This design represents French contemporary work.

Wood Carving.

A short time since Mr. T. R. Scott, of Dublin, Ireland, a practical member of the cabinet making and art furnishing trade, delivered a lecture to carvers and polishers before one of the technical schools of that city. His remarks have been reported in full by one or two of the English trade journals, and, while they were addressed particularly to Irish artisans and artists, they are still of interest to those working in the same lines of trade in this country. Mr. Scott is eminently practical in his methods, and his remarks were of a character to appeal directly to the interest of his hearers. Throughout they were illustrated with drawings and sketches, many of them being made impromptu before his audience. We have room only to present a single illustration on this page. It is a study intended to show the importance to carvers of being able to draw from the round, and it is only one of a number of sketches which were submitted on the occasion named.

Wood Carving.—Study Illustrating the Importance of being able to Draw from the Round.

The central idea of Mr. Scott's advice to young carvers is: "Do not copy, indiscriminately, works attributed to famous, though often erratic, men. On the other hand, have some degree of originality, and develop that degree of talent so that it will enable you to adapt yourself to circumstances." The wood carver is advised to always carry a sketch book in his pocket, and to take sketches of bits of gold work whenever the opportunity presents itself. To this end it is necessary for him to be a good free-hand draftsman. The lecturer, with blackboard illustrations, showed the importance of drawing in various styles. He illustrated free-hand geometry, chalk drawing in the rough, and finished shaded drawings, one of the latter of these being what we have reproduced on this page. The young student in selecting examples from which to copy was admonished to be sure that he has good specimens. Good style is as easily acquired as bad. The young man is informed that he must contend against machine-work in making panels, friezes, moldings, &c., and is reminded that no machine yet invented has ever produced artistic work. Referring to foreign carving—Swiss, French, Belgian and Italian—the speaker said that it was to the latter that we must look for the finest specimens of modern renaissance work from which to copy. In illustration of this idea, two panels and also a pedestal surmounted by a cupid were submitted as specimens of work in the Italian style.

The Clerk of the Works.

The term and business of the clerk of the works are practically unknown in this country. In England, the clerks of the works constitute quite a large class, have their own society, and form a useful, prosperous, and intelligent body of men. Here, a synonymous term would be building superintendent. In both countries the general custom is for the architect, who draws up a design, to personally superintend its execution. This necessitates a visit to the job once a week, or oftener, according to its extent. But when a building in course of erection is very large, as, for instance, a city hall, a private mansion, or any other building of great extent, the works need, in the interest of the owner, a constant supervision, and so the business of the professional clerk of the work arises. The custom of employing such a superintendent is much more common in Great Britain than it is here—in fact, in the former country, few jobs of any considerable extent are carried out without his aid.

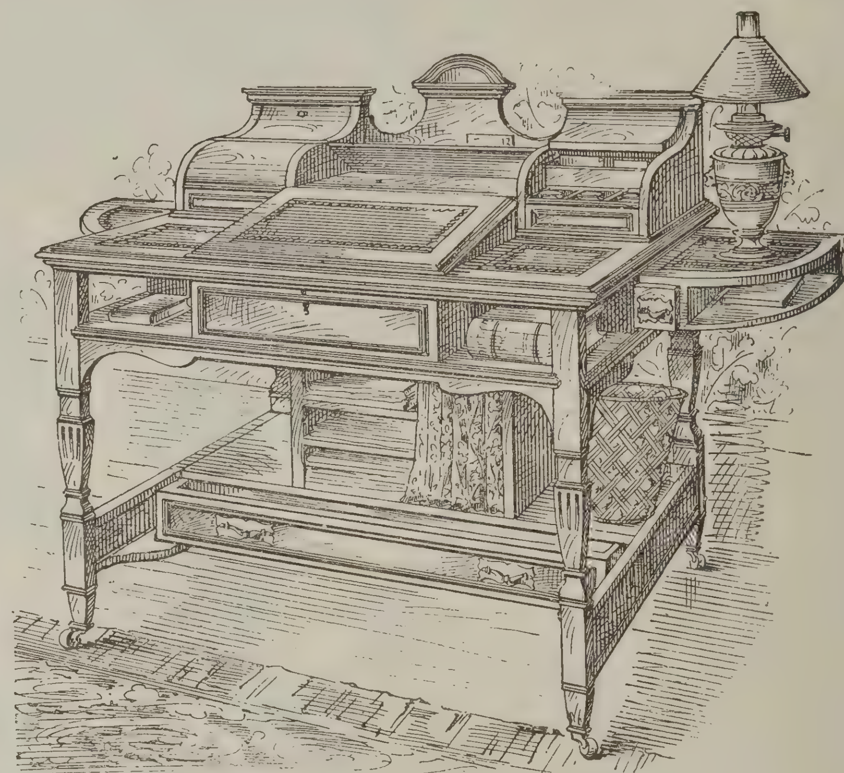
The duties of a clerk of the works are essentially those of superintending the construction of a building, as a deputy for the architect. He has to see that the work is carried out exactly in accordance with the drawings and specifications. He cannot alter any of the construction on his own responsibility; neither is he supposed to interfere directly with the work of the mechanics. His orders are, however, by courtesy accepted by the contractor and foremen, and it is not seldom that his personal knowledge is of great benefit to the workmen in helping them out with any complicated or difficult problem arising in the construction. One of his most important duties is to examine the whole of the material delivered upon a job, and to reject any portion which is not of the specified quality. Another is to take measurements, and keep a list of any extra work which may arise during the course of the erection of the building, and in like manner to keep an account of work not carried out in consequence of alterations being made in the

original plans, so that due allowance may be made for them. As a rule, the clerk of the works is a mechanic, often a carpenter or mason, who is above his fellows in intelligence and knowledge. Sometimes a draftsman will act in this capacity, but the necessary and very intimate knowledge of construction and of the characteristics of good materials is such that few are other than advanced mechanics of extensive practical experience. The salary usually paid may be said to be about twice that of the carpenter or mason, and many a young mechanic will study hard in his leisure hours in the hope that he may eventually get to be a clerk of the works.

Designs for Overmantels.

We continue in this issue the series of designs for overmantels which has been running for some time. The subject to which we give special attention at this time is an overmantel suitable for a library. In the estimation of the author of the design which we publish, the overmantel should be fitted with a shelf or two to carry small volumes. Another shelf might be fitted or fixed across the whole length of the middle division just above the mirror. It should be put within reach, since it would be handy to hold small books, or it could be utilized for the display of specimens of china or works of art. The silvered plates should be of small size, for a large glaring mirror would look very much out of place. It is sometimes objected that a mirror in a library overmantel is out of place, but small squares of glass serve to make the apartment look bright and attractive. Such an overmantel as we have described is shown in Fig. 1. The dimensions of the backings will be the same as those given for the design shown in a previous paper, with the exception of the cross-bar underneath and above the cove. The bar under cove should be 2 inches wide and should work out to the following sizes: $\frac{1}{2}$ inch for molding of center plate, $\frac{7}{8}$ inch for "flat" and $\frac{1}{2}$ inch for molding to form rabbet for cove. The cross-bar above cove should be $1\frac{3}{8}$ inches wide, which would allow $\frac{7}{8}$ inch for flat and $\frac{1}{4}$ inch for molding to lip on at top and bottom. Next veneer front, and clean up pilasters and fix them. Veneer sides as before, then get brackets for cove out of $\frac{7}{8}$ inch stuff, and fix a rib $\frac{3}{8}$ inch wide to form a rabbet. The width of the bracket and rib when fastened together should be the size of block of pillar, which is $1\frac{1}{4}$ inches. The block of pillar should be fixed on bracket of cove, and a piece of 1 inch stuff butted between blocks to form rabbet for top of cove. The cove next engages our attention; it should be of deal in this instance, as it is intended to be paneled with Japanese leather paper. The curve of cove might next be marked out; it should be jointed together in three angles and fitted. Then cut out stuff for frets, turnings, brackets, &c., and prepare curved panels and the pediment for carver. The cornice moldings should now be worked as before described, and then the top and bottom fret rails got out and grooved, so that frets can be inserted. Then proceed to fit up. The leather on cove should be fastened with glue. Enlarged sketches of detail of cornice molding, section of cornice molding, detail of pillar, base molding front of shelf bracket, and suggestions for two alternative carved panels are given herewith. Our sketch, we may add, is intended for an overmantel, 4 feet 2 inches wide by 3 feet 4 inches high (outside measurement). The sizes of center plate would be about 2 feet 1 inch by 1 foot 3 inches; of oblong side plates, 6 inches by 12 inches, and of small mirror at top 6 inches by 5 inches.

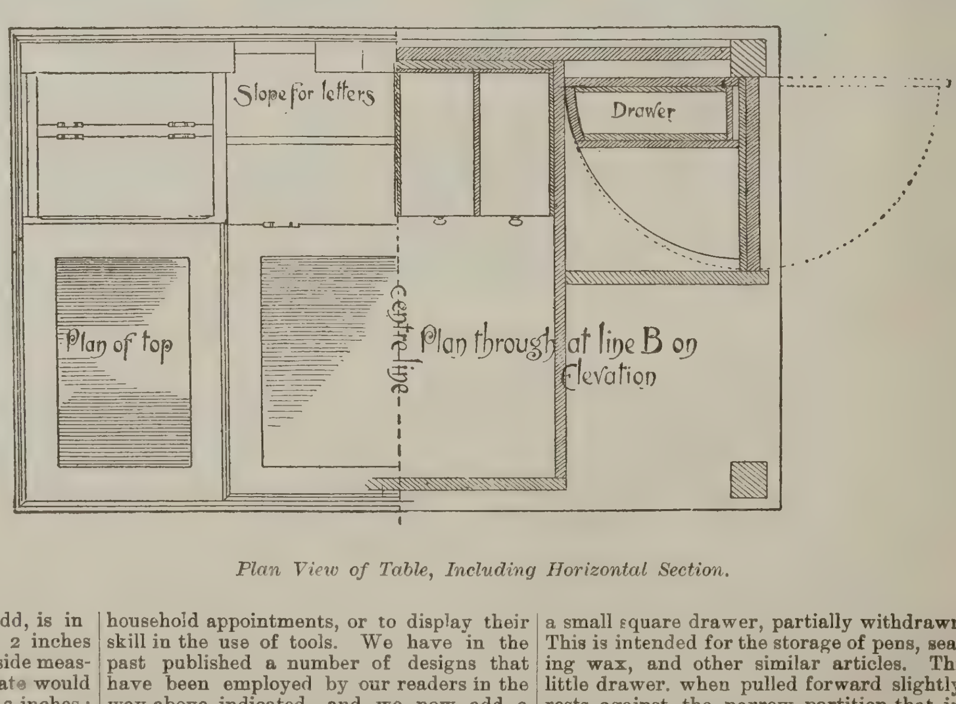
Our second design, for a library overmantel (Fig. 2), is intended to be of the same size as Fig. 1. We do not show a cove in this instance, but have substituted two beveled plates. The effect of rounded corners to all the mirrors and panels is pleasing. A different pediment is shown, and the three beveled panels above the top shelf might be of wood. No carving is introduced in the job, except on the pediment. This design, we think, would make up into a neat and effective looking overmantel.



Convenient Library Table.—General View.

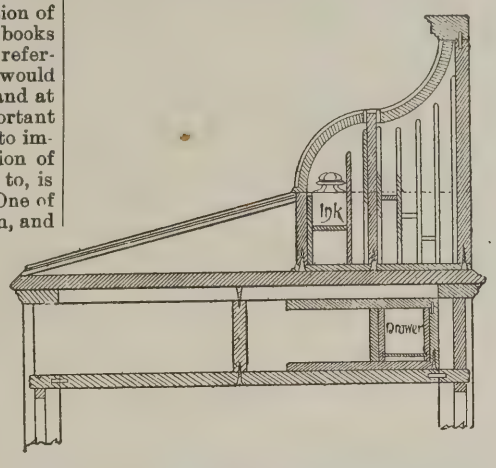
A Convenient Library Table.

It has long been the fashion among carpenters and amateur, wood-workers as well, to occupy their leisure moments in the construction of odd articles of furniture that serve to add to the convenience of their household appointments, or to display their skill in the use of tools. We have in the past published a number of designs that have been employed by our readers in the way above indicated, and we now add a general view of a convenient library table, together with details, which cannot fail to be appreciated by this class of people as well as by many others. The table is well proportioned, whether it be employed for regular literary work, for business purposes, or used simply as a piece of parlor or library furniture. The desk occupies the middle part, leaving abundant table room on either side for the classification of letters and other similar work, which frequently demands extra space. A feature is the quarter-circle drawer, which is shown at either end. When withdrawn, this drawer serves the useful purpose of an extension for holding a lamp, as indicated in the cut. Instead of taking the form of an ordinary drawer, so far as its capacity for containing papers is concerned, it assumes the character of a recess for the reception of blotting paper, letter portfolio and similar accessories. At the end of the quarter-circle, and shown at the right in the large cut on this page, is a small square drawer, partially withdrawn. This is intended for the storage of pens, sealing wax, and other similar articles. This little drawer, when pulled forward slightly, rests against the narrow partition that incloses the wing, when the same is not extended, as shown in the cut. It acts as a check to hold it in position when open. As already remarked, the center part of the table is arranged as a desk, and the lid lifts

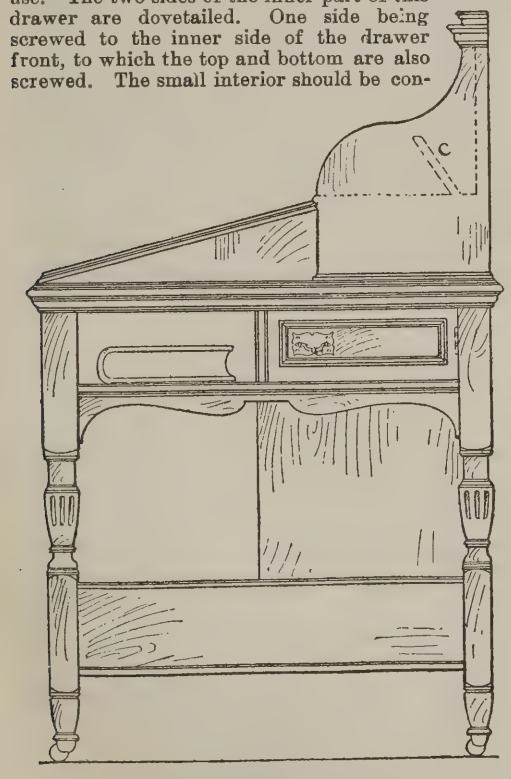


Plan View of Table, Including Horizontal Section.

up. The interior thus revealed is provided with the usual fittings, consisting of pigeon holes, small drawers, &c. The angular arrangement between the stationery boxes upon the upper part is for the reception of letters which are ready to be mailed. The open space in the table-framing on either side of the desk is for the accommodation of a dictionary, time-table, and other books likely to be required for immediate reference. Conveniently located, as they would be in these places, they are ready at hand at a moment's notice, and this is an important matter to the busy writer who desires to improve every moment. The construction of the stationery cases, already referred to, is clearly indicated in the drawings. One of them in the general view is shown open, and the other closed. The under-framing of the table is fitted in a way to supply a long-felt want—a place for the reception of unbound periodicals and newspapers. The long drawer forms a suitable receptacle for prints, plans and large-size drawings—things which often call aloud for a place of repose. This drawer, when opened, is supported by the foot-board brackets shown upon either side, and, accordingly, the whole drawer may be withdrawn without danger of its suddenly dropping to the floor and discharging its contents at one's feet. In constructing this table, the top should be framed up, leaving an opening in the center to allow for the desk, which should be made separate and dropped on to the shelf below. In consequence of the open space upon each side of the desk, the framing cannot be made from leg to leg in the general way, but must be arranged with inch lining under the top and screwed to the top of the legs. The shelf under the top, being all in one piece, helps to strengthen the table, in consequence of being doweled into the legs. The quarter-circle swing drawer should be hinged to the legs, as indicated in the side elevation submitted herewith. The front of the swing drawer and the bracket being all in one piece, admit of the introduction of two hinges, which affords sufficient strength and durability for ordinary use. The two sides of the inner part of this drawer are dovetailed. One side being screwed to the inner side of the drawer front, to which the top and bottom are also screwed. The small interior should be constructed in the usual manner. In building the two O G stationary boxes on the table top, one piece of material should be made to answer a threefold purpose—namely, that of backing up the two boxes and forming the center pediment between them. This back should be dovetailed into the two outer ends of the boxes, and the inside ends should be screwed to the back board from the outside. The small pieces of wood which form the front of the boxes should be dovetailed into the two sides of each of the boxes. In the center of the inside of each of these stationary receptacles should be a partition grooved up from the bottom into the sides. The O G lids are hinged. The construction of the stationery fittings, we think, requires no explanation further than that indicated by the working drawings. The same remark applies also to the drawers, shelves, &c., in the lower portion of the table. The drawings as we have presented them are without any indication as to scale. The parts are carefully proportioned, however, and the reader is at liberty to establish his own dimensions, and from them construct the scale that will enable the work to proceed.



Cross Section Showing Arrangement of Stationery Cabinet.



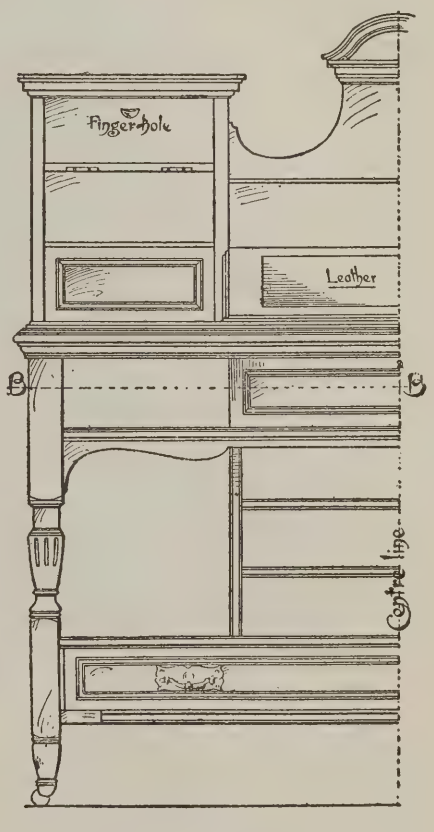
Side Elevation Indicating Pitch of Slope for Letters.

A Western Cottage.

We are indebted to Mr. A. L. Myers, of Lincoln, Neb., for the drawing from which the accompanying engravings of a story-and-a-half cottage have been made. Some of the descriptive matter which Mr. Myers has sent us in connection with this design will be found of interest to our readers. In the first place, Mr. Myers directs attention to the fact that he is not a professional architect; but, instead, is a practical man, and asserts that his principal teacher has been *Carpentry and Building*. The designs published in our pages in the past in connection with a volume with which many of our readers are familiar, "Drawing Instruments and How to Use Them," have been his only helpers. He says, however, that he must not forget "Jack Plane," and that in all probability a large share of the credit is due to "Jack." Our readers, therefore, are invited to inspect what is here submitted as being the work of an enterprising young carpenter in the West. Our correspondent says, in his description of the design, that cottage houses are preferred west of the Missouri River. They are low, and, accordingly, the wind has not so great an effect on them. People in Nebraska and in adjoining States, frequently have caves, so that when a tempest is raging they have some place of refuge. His intentions in preparing this design have been to avoid the necessity of a cave, and make the cottage itself a safe refuge. The nights in Nebraska are cool; accordingly, upstair rooms are always pleasant and well aired. In this design it will be noticed that each chamber opens into the hall, which apartment can be well ventilated. Referring to the general design, it will be noticed that all handwork is shown; very little molded work is employed, and no factory work at all. The nature of the design is such as to make it easy of execution. The plans were drawn for a corner lot, facing south and west. "If any of the readers of *Carpentry and Building*," our correspondent goes on to say, "are pleased with the floor plans I submit, I shall be glad to have them supplement my design by a two-story elevation adapted to the same floor plans. The drawings, I believe, show all features sufficiently plain to make further explanation unnecessary."

Egyptian Stone Work.

Whatever skill our masons of the present day may possess, it would seem that their efforts were entirely outshone by the accomplishments of the ancients. One of the daily papers presents the following: "Persons who inspect the Obelisk in Central park for the first time frequently express astonishment that so large a block of stone could have been successfully quarried, carved and handled by the ancients, especially as such work is done with difficulty, even with the improved machinery of the present age. In talking the other day with one of the leading granite men of the country, who has made a personal inspection of the pyramids of Egypt, he said 'There are blocks of stone in the pyramids which weigh three or four times as much as the Obelisk. I saw a stone whose estimated weight was 880 tons. The builders of the pyramids counted human labor lightly. They had great masses of subjects upon whom to draw, and most of their work was done by sheer manual labor and force. There are stones in the pyramids 30 feet in length which fit so closely together that you may run a penknife over the surface without discovering the break between them. They are not laid with mortar either. There is no machinery so perfect that it will make two surfaces 30 feet in length which will meet together in unison as these stones in the pyramids meet. They were undoubtedly rubbed back and forth upon each other until the surfaces were assimilated to each other.'"



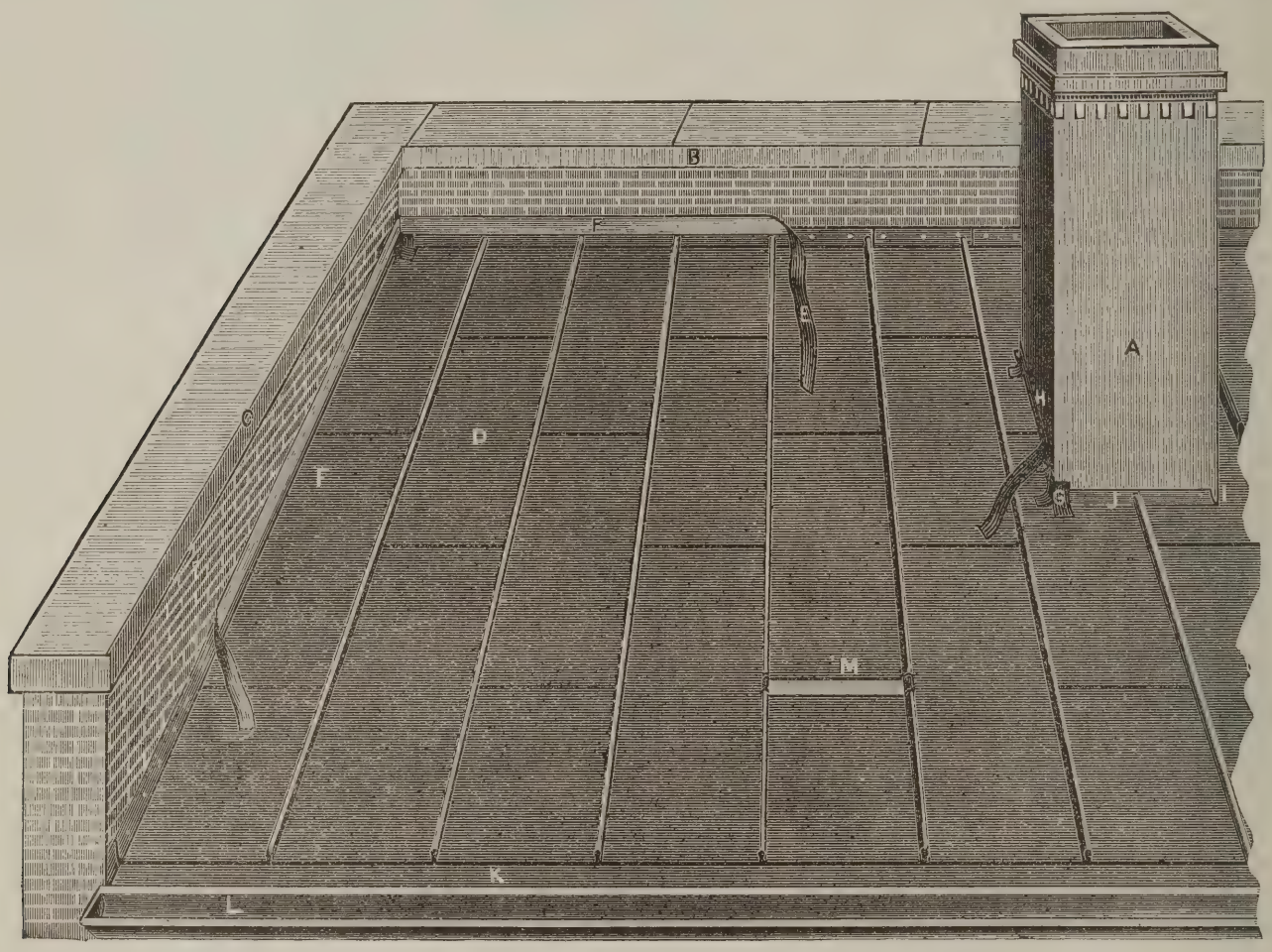
Half of Front Elevation.

Glue Which will Hold in Water.—Powder and dissolve 1 part of glue in 1 of thick linseed-oil varnish boiling hot, and mix thoroughly. In using it, heat the two planed sides of the wood, apply the glue warm, and press the pieces together.

ROOFING NOTES.

Method of Flashing and Repairing Metal Roofs.

Mr. L. L. Sagendorph, of the Sagendorph Iron Roofing and Corrugating Company, Cincinnati, favors us with a description of his process of finishing and flashing iron and other metallic roofs. The engraving presented on this page is from the catalogue of the company, and affords a convenient means of reference to the features of the work. We understand from Mr. L. L. Sagendorph that the plan described, although here shown in connection with iron, is in his estimation, equally applicable to tin and slate work, and that the means described have been employed by his company for a long time past and have proven very effectual. Referring to the engraving, A represents an ordinary brick or terra-cotta chimney, against which the ironwork referred to is to be finished. At G there is shown the manner of closing a corner cut. A fibrous material is introduced as indicated by H, and also as shown at E in the counter flashing of the main roof against the fire-wall. This fibrous material is saturated with a peculiar cement manufactured by the company, and adheres to the brickwork, also to the ironwork in a way to make a water-tight joint, and yet, at the same time, afford the opportunity for the necessary contraction and expansion. F shows the counter flashing of the roof completed. The iron is first turned up, as shown near the eaves, and is fastened in place by nailing or blocking, then the fibrous strip already described is put in place, lapping over the edge of the iron, and coming against the surface of the brick. Referring again to the chimney, I represents a corner, as it would be left with the iron roofing alone. After the iron is cut, as indicated, the corner patch G is applied, and afterward the fibrous flashing strip is brought around. Three inches is named as the amount of iron to be turned up against a wall for nailing. At M in the cut is indicated a method of using the same fibrous strip for repairing a broken seam in an iron roof. The material is applied in much the same way as indicated above, and we understand from Mr. Sagendorph that it has been tried in various climates, and has proven satisfactory in all cases. We understand that the company are supplying this material for flashing and finishing roofs in this manner to the trade in general.



Sagendorph's Method of Flashing and Repairing Metal Roofs.

Tile Roofing.

One of our English exchanges, discussing tile roofing, says:

The use of tiles for roof covering, instead of slate, is now spoken of very favorably. A slate roof, under the action of fire, and particularly if water is thrown on it while hot, cracks and flies in all directions, opening crevices through which a strong draft is immediately set up, increasing the fury of the flames in the building which the roof is supposed to protect. On this account even cedar shingles are preferred to slate for roofing by many experienced fire engineers, for the reason that, inflammable as they are, the shingles do not fly to pieces when a cinder falls on them, but char, and, until burnt through, at least serve to prevent fire inside the building from breaking out of the roof. Tiles, unlike slates, never crack or fly, but keep their place even when red-hot; and their thickness and non-conducting property enables them to keep the heat from cinders or burning brands for an indefinite time from affecting the boarding beneath them. The main objections to the use of tiles have hitherto been their cost, and the difficulty of laying them so as to keep out our fine, drifting snows; but, with a little effort, particularly if architects and insurance managers could act in concert in the matter, both defects might be overcome. A considerable demand, says an American contemporary, would soon make tiles here (America) as cheap as they are in England or France, or Germany, where they are the universal roof covering, and roofs laid with them might easily be made not only impervious to snow, but proof against the shaking of winds or earthquakes, by laying them in mortar or cement. This, with cheap tiles, would not be an expensive matter, and while a slate roof constantly needs repairs, tiles in cement, laid on a roof of simple form, are almost indestructible. Thousands of roofs in France and Germany, laid in this way 400 or 500 years ago, are still in good condition, and they not only are really solid and enduring, but look so, presenting an appearance of substantial comfort which architects well understand.

ONE OF OUR ARCHITECTURAL EXCHANGES presents the following remarks with reference to roof repairing: "During the winter and spring much trouble is occasioned by leaky roofs, and it frequently happens on account of the snow, ice, or water on the roof a regular roof repairer would have difficulty in mending the roof if he were to use the usual methods. It is well known that it is difficult to solder tin when it is covered with water, yet it often happens that in removing ice or snow from a roof holes are cut in the tin by the shovel. Such holes can be stopped without much trouble by taking a piece of heavy iron, of suitable size, with countersunk holes for ordinary screw heads. A piece of thick cloth is to be cut the size of the iron, well soaked in heavy iron paint, the cloth placed over the leak, and the piece of iron screwed down over the cloth. Holes can be punched through the tin by means of a prick punch. If the tin can be wiped dry before applying the cloth, so much the better."

THE CINCINNATI STAMPING COMPANY have appointed as their Western agents Messrs. Douglass & Cade, 270 South Clinton street, Chicago, Ill. (formerly with Kinsely & Miller, of that city), to represent the Regan patent metallic shingle. The company report an exceptionally good trade this season, the demand having been fully equal to the capacity of their works ever since January 1, 1887.

Montross Roofing Specialties.

The Metallic Roofing Company, of Canada, Limited, with office and factory at No. 82½ Yonge street, Toronto, Ontario, are putting upon the market a number of specialties in the line of sheet metal roofs that will interest our readers. Some of them are illustrated in the accompanying engravings. Fig. 1 shows a form of siding which is made under the Montross patents on shingles. It is claimed to successfully allow for contraction and expansion, as well as for uneven settling of the building; accordingly, it is recommended for use for factories, elevators, warehouses, &c. In the size in which it is made, each sheet covers when laid 17¼ x 22¼ inches. Fig. 2 represents what is known as the company's "No. 1" pattern of shingle. These shingles are provided with a simple side-lock, shown in Fig. 3, which represents an enlarged cross-section. It is claimed for this lock that it forms a thoroughly storm-proof, telescopic joint, and, at the same time, amply provides for contraction and expansion in any changes of temperature. The upper ends of the shingles are nailed to the sheeting, leaving the lower end and sides free to move by contraction or by expansion. The lower end is held in position by cleats, which are clearly indicated in the engraving. These cleats are riveted on the upper edge of the lower shingle, and when they leave the factory are in the position shown by the two outer shingles in the lower row in Fig. 2. As the upper course is laid, these cleats are bent up and over the lower end of the upper shingle and thus fasten it in place. By this construction, the makers point out, the nail heads are covered by the course above. The shingles are made of double pattern, as indicated in the cut—that is, each shingle has two figures—and in laying the joints are broken. Thus Fig. 2 represents three complete shingles in position. The upper and lower edges are provided with a number of corrugations which serve to break up the surface and stiffen the sheets, and, by a system of interlocking, prevent rain or snow driving through. In laying the courses, lap about 3 inches. The size commonly manufactured covers 15 x 22½ inches.

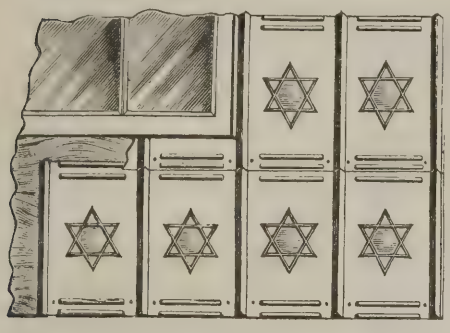


Fig. 1.—Sheet Metal Shingles Used for Siding.

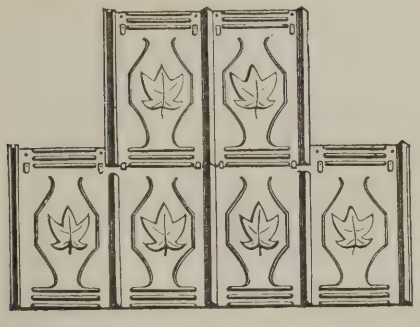


Fig. 2.—Montross No. 1 Shingle.

Fig. 4 represents what the company call its "Perfection" pattern. This device is manufactured of a size to cover 11½ x 12 inches. It is made from square plate, and the edges are of the forms shown by the cutlines in Fig. 5. In construction this shingle may be described as an improvement on the celebrated "Canadian" or "Diamond" roofing, that has been so widely and favorably known throughout the country for 75 years or more past. The shingle is claimed to possess the advantage over the so-called

Fig. 3.—Section Through Side Lock.

"Canadian" roofing of having an expansive lock-joint along one of its lower inclined edges and a nailing flange and lock along the opposite edge, as illustrated in the cross-section in Fig. 5. The other edges are provided with certain corrugations that stiffen the plates, causing them to fit more closely together and adding to their appearance on the roof. The makers point out that with this flange the necessity of nailing through the lock or body of the plate is entirely obviated. They also state that these shingles may be laid on the roof right or left, in horizontal or oblique courses, as may be preferred. Any number of men may simultaneously work on the same course, an advantage which, it is claimed, no other metal shingles admit of. Accordingly, it is only a question of the number of men, in order to complete the largest roof in a single day. Our last illustration, Fig. 6, shows what the makers call their Dimension shingle. This shingle employs the same lock as illustrated in Fig. 5. The shingles when laid cover 8¼ x 12 inches. They are struck up in a pattern to represent

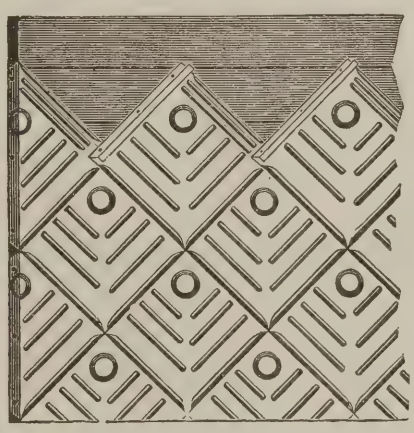


Fig. 4.—The Perfection Pattern.

smaller sizes, and very closely imitate the appearance of shingles, slate or tile when in position. We understand that these goods are made of tin or galvanized iron, as required.

Items.

The Anglo-American Roofing Company, of New York, a corporation well known to many of the readers of this journal, and a pioneer in the sheet-metal shingle industry, have sold out their business to the Anglo-American Iron Roofing Company, of Pittsburgh. The address of the new concern is Room 810, Penn Building. We understand that the new company consists of Andrew Jackson and Wm. H. Graff, of Pittsburgh. The new concern propose to continue the old business of manufacturing shingles of galvanized iron, leaded iron and calamined iron, also of black iron, painted. We understand that they add some new goods in the way of tin shingles, which they will bring out at an early day, and that they also contemplate entering upon the corrugated-iron roofing trade. Mr. Chas. Young, formerly secretary of the Anglo-American Roofing Company, of New York, will act as their agent for this city, continuing his office at the old stand, No. 22 Cliff street.

Cooper Hamsley & Co., of Nashville, Tenn., have issued a circular of instructions to their agents showing how their shingles are best laid in covering a roof. The circular also refers, incidentally, to the way a customer should be handled in making a sale, and the first sentence of the circular is strikingly characteristic. It is worded as follows: "The first thing to be done on presenting Hamsley's patent tin shingles to your client is to avoid using big words." This advice might be appropriately applied to many other goods in the market.

The Lloyd Iron Roofing and Paint Company, of Chicago, report business good and sales considerably in excess of last year. They are directing special attention to the merits of the roofing paint and cement of which they make a specialty, and the demand for which, we are informed, is steadily increasing.

A metallic joint for felt and other roofs is the subject of a patent recently granted to J. D. Brown, Jr., of Camden, N. J. The invention relates to the use of plates or strips of metal in securing ductile roofing material, such as felt, tar paper, manila paper, canvas, &c., to roofing boards. The invention consists in shaping and applying the metal strips so that the nails pass through them and through the roofing material at the joint between the sheets and prepared folds in the body of the sheets. The nails and the strips are covered by the roofing material, so as to conceal them and protect both from the weather.

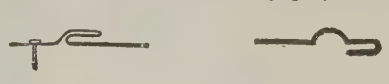


Fig. 5.—Cross Section Through Lock.

With reference to the slate deposits in Georgia in the vicinity of Rockmart, a local paper says: "Slate is inexhaustible. One thousand men could not work it out in thousands of years, and is to be found inside of the incorporation to 5 miles around. It is adapted for anything that slate is used for, and is the best building material known. It is equal to granite in strength and durability. Nearly every house in Rockmart is covered with it, and the Methodist and Presbyterian churches are built of slate, besides three of the storehouses in town. The mansards of the Kimball House, in Atlanta, are covered with slate from Rockmart, and the Anniston, Ala., inn is covered with this slate."

One of the handsomest downtown buildings is that which has just been completed at the lower end of St. Paul's Churchyard, in Church street, New York, for the occupation of the officers of Trinity Parish. It takes the place of a dingy pile that formerly occupied the site, which in turn succeeded a still smaller building many years since. The new building, which cost some $150,000, may be described as of the collegiate order of architecture, and presents a quiet, cloisteral aspect that is in keeping with the purpose for which it was designed. The building, while not strictly fireproof in its construction, is of a character to burn slowly. Very good work has been done in various parts of the building, especially in the roof. The space between the rafters was filled in with porous terra-cotta, and over this Pennsylvania slate has been laid, forming a very neat roof and one that is free from most of the objections that are commonly urged against slate roofs in cities.

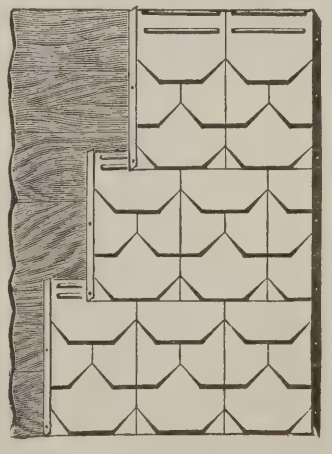


Fig. 6.—Montross Dimension Shingle.

CORRESPONDENCE.

Pitch of Roofs.

From M. O. F., *Nevada City, Cal.*—I have a dispute with a brother tinner with reference to the pitches of roofs. My argument is that the term one-half pitch, one third pitch, &c., refers to the fractional parts of the ¼ circle—in other words, the fractional part of 90°. Therefore, one-half pitch would be an angle of 45°, and one-third pitch, 30°, and so on. The argument of my opponent in this controversy is, that a roof that rises 12 in. in 12 in. run, is full pitch; while a rise of 6 in. in 12 in. run is one-half pitch, simply because 6 is one-half of 12. By the same argument, a rise of 4 in. in 12 in. would be one-third pitch, because 4 is one-third of 12. Will you please explain this subject and greatly oblige?

Answer.—The term pitch referring to the slope of the rafters of a roof, as used by architects and builders, is dependent upon both span and rise. Pitch is expressed in several different ways. Sometimes it is given in the degrees of angle which the rafter makes with the horizontal. This method, however, is not in common use outside of the books. The most general plan, however, of expressing pitch is by the hight in parts of the span. Accordingly, it is quite common to hear a roof spoken of as one-half pitch or one-third pitch. If, for example, the span is 30 feet and the hight is 10 feet, the pitch by this method is called "third pitch." Another plan, but not in such general use, is by the length of the rafters in parts of the span. Thus if the span is 30 feet and the length of the rafter 20 feet, by this method the pitch would be called "two-thirds pitch." It would seem from the statement made by our correspondent above that neither he nor his opponent in the controversy is correct. The latter is manifestly wrong, and he employs terms which have apparently been invented for his purpose. For example, notice the term "full" pitch. In describing his own explanation of these terms, our correspondent fails to indicate how the angle is to be measured, and we do not know that we quite understand what he means, although his description of the method is apparently plausible. What we have printed above is the recognized standard adopted by builders and architects in general.

Plane Bit.

From L. W., *Ironton, Ohio.*—I notice in the June issue, among the Novelties, the revival of an old idea in plane bits, patented in England prior to 1876. I have one of the irons in my possession, bought of the patentee, a Mr. Manning, in the spring of 1876. The idea is a good one, if not new. The same idea, I may remark in passing, has been used on planer bits, but has been abrndoned for the solid knife. I mean no harm in what I have here written, but simply desire to call attention to a fact that may be of interest to the readers of *Carpentry and Building.*

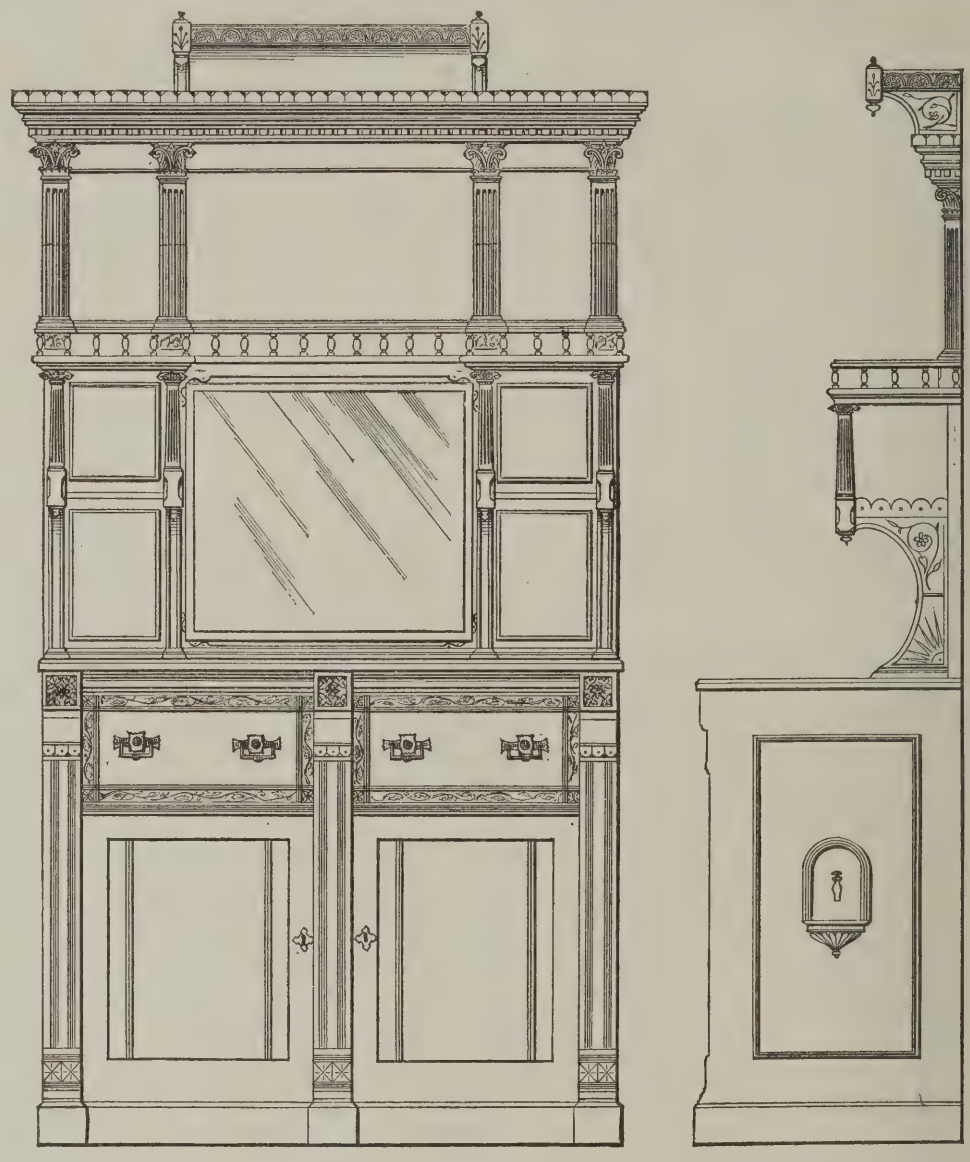
Carpenter's Tool Chest.

From S. L. M., *Minneapolis, Minn.*—Will some of the readers of *Carpentry and Building* send in sketches for carpenter's tool chest. I have never yet seen a tool chest which corresponded to my idea of completeness in such an article. The chest should not be too large and unwieldy, but should be so constructed that each particular class of tools can be kept separate, all of them so arranged as to be easy of access at all times. The great trouble with most tool chests is that they seem to be constructed without any idea of order, safety and accessibility. I think there is room for great improvement, and if the readers of *Carpentry and Building* will furnish their ideas, I think the result will be something of considerable interest to many of your readers.

Note.—Our feeling is that the subject of tool chests was practically exhausted some time since in our columns, and, for the most part, since the publication of the designs referred to, we have been in the habit of referring those of our subscribers who have written to us upon this subject, to what has appeared in our pages in the past. We are reminded, however, that our circle of readers has been greatly extended in the interval since this subject was discussed, and that, therefore, there is the likelihood of serving the trade if we once more bring up this question for consideration. For this reason we have published our correspondent's inquiry, and we supplement it with a request to our readers to send in anything they may have which seems to answer our correspondent's requirements. It will give us pleasure to make engravings of the sketches sent, and to present the same to our readers in the most attractive way.

Design for a Buffet.

From JOHN B. WALTER, *Baltimore, Md.*—I send you a drawing for a buffet which I built for myself a short time since. I am only a journeyman carpenter, but sometimes even a journeyman can give his fellow-workmen ideas that are of benefit to them. If you think any of your many readers will get an idea from the design inclosed, or will be able to criticise my work so as to give me an idea to improve it, I would be pleased to have you publish it. The drawing, I think, explains itself sufficiently to be understood. One-half of the buffet is made for a refrigerator. The ice-pan is lined with porcelain and is provided with a silver faucet. All the panels are veneered with French walnut, and the glass is French plate with beveled edges. All the locks are the best spring locks. The carvings used in this design I did during leisure hours.



Design for Buffet, by John B. Walter, Baltimore, Md.—Figs. 1 and 2.—Front and Side Elevations.—Scale, ¾ Inch to the Foot.

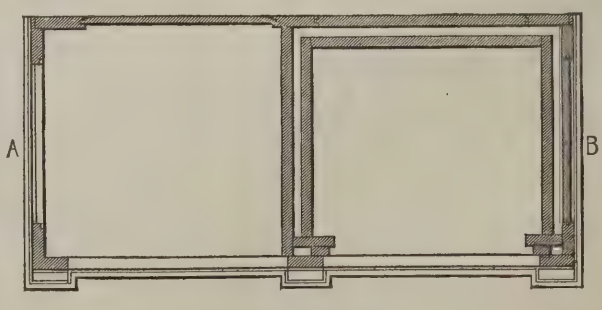
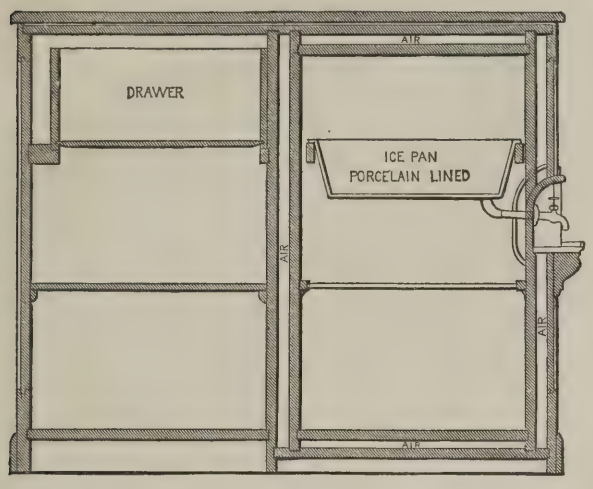


Fig. 3.—Plan View.

The work is built entirely of solid walnut.

Note.—Believing that our readers will be interested in what our correspondent has sent us, both in the sense of gaining ideas from it and, perhaps, also in criticising his work, we take pleasure in presenting the engravings made from the drawings he has sent us. The work is somewhat ambitious



Design for Buffet.—Fig. 4.—Section of Line A B of Fig. 3. —Scale, ¾ Inch to the Foot.

in its general design, and has been very carefully executed, and is creditable in design, plan and execution. It has required no small share of patience to work out the carvings, which, as we understand it, our correspondent has done entirely himself.

Chimneys and Ventilation.

From X. X., *New York.*—It would seem that in America more attention has been paid to the art of building comfortable houses, and that here this art has been carried to a greater perfection than in any other country of the globe, and average Americans, whether living in town or country, can say that they are better housed than the people of any other nation.

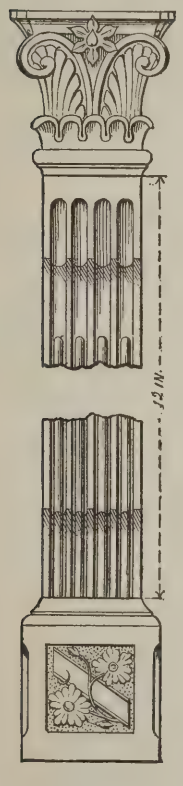


Fig. 5.—Detail of Capital and Fluted Pilaster, Scale, 3 Inches to the Foot.

Yet, while we have in a great part of our country a climate which for some months of every year is almost arctic in character, and which involves dependence upon fires during nearly half the year, the chimney is a much-neglected portion of our domestic architecture. This is the more unaccountable, since upon the performance of the chimney depends, in a great measure, the comfort, and in many cases the health of the house. Stoves, ranges and furnaces smoke and emit gases, and the intelligent householder condemns them. To remedy the troubles he seeks out a manufacturer who makes steam-tight furnaces and ranges, in which every joint is as tight as a boiler seam. He thinks he has in this feature of construction the remedy for his troubles. He seldom thinks of having a good chimney put in the place of his old one, which, were the fact known, is responsible for the whole of the fault. This carelessness in regard to the chimney is surprising, because it comes from indifference or inertia, and not from lack of knowledge. People seem to regard a bad chimney as a sort of dispensation of Providence, to be endured like a cold winter or a heavy storm, and not like an evil thing which can be made right.

The faults of the average modern chimney are many and great. The commonest fault is that the flues are too small. This, with the roughness, which is the besetting sin of the flues, makes it almost impossible to produce a draft. Sharp bends, which are also introduced quite frequently, still further diminish the draft. Thin walls to a chimney greatly aid in cooling the air inside, and when we find that the chimney is placed in an outside wall of the house, there is little wonder that the draft is poor. Common sense would dictate placing the chimney in the center of the house, or in a position where the hot flues would not be cooled off in the vain attempt to heat "all out doors." Again, placing the chimney in the outside wall in many cases brings it through the roof at a low point. Unless the chimney shaft is unnecessarily tall, the top is below the roof, and a smoky chimney results from the wind blowing down over the roof peak.

Rough flues favor deposits of soot, rendering frequent cleaning necessary where bituminous coal is used, and forming lodging places for the creosote-laden soot from wood fuel. In the one instance the draft is stopped in a short time, and in the other the creosote soon attacks the mortar. In wood-burning portions of the country a very large percentage of the kitchen flues will be found to have the mortar badly corroded from this cause. When wood is in any way exposed against such flues fire is very likely to follow in time, and the leaky chimney puts an end at once to itself and the house.

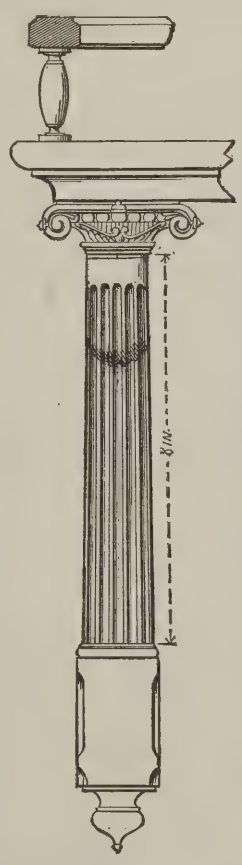


Fig. 6.—Detail of Column and Railing.—Scale, 3 Inches to the Foot.

Corrosive as is the creosote from a slow wood fire, the soot and gases from the bituminous coals of the West seems to be even more destructive to mortar. The worst attacks appear to be made upon the outside of the chimney tops. This, it would seem, in the absence of any direct chemical proof, was the result of the action of rain water upon the sooty deposit.

The huge brick chimney which our ancestors were wont to raise in the centers of their dwellings was the outgrowth of long experience. Comfort meant an ample fire with a good draft, and no suggestion of smoke and no danger from fire. They built therefore a stack of chimneys with ample flues.

Each of the fireplaces on the lower floor had a flue to itself, and very often those on the upper floor were equally well provided. Being in the center of the house, the chimney pierced the roof at its highest point, and in those old-fashioned square houses with pyramid roofs there was not even a ridge along which the wind might be driven in eddies. The draft was unexceptionable, and a smoky fireplace was a thing not to be found. The strength of draft obtainable from such a chimney was

Fig. 7.—Details of Carvings.—Scale, 3 Inches to the Foot.

surprising. It sometimes happened that, for the sake of convenience, an opening was made through the hearth into the ash-closet in the cellar. This opening, which was covered with a sliding plate, was used for dropping the ashes into the ash-closet and as a blower for the fire. It usually took up the space of a brick. When opened to the entent of half an inch, the fire would roar like a blacksmith's forge when the bellows is going. Such a draft is not to be found once in 50 times in any modern-built chimney.

To produce a good and satisfactory chimney, something of the old principle must be observed in its construction. Both for the protection of the flues and the utilization of the heat, the stacks should be in a central position in the house. This has a double advantage; it enables the flues of several rooms to be combined, and it brings the chimney near the highest portion of the roof. It can, therefore, be made to rise above all projections without the necessity of making a long neck and unsightly draft. Instead of being a neglected portion of the house, the chimney should be planned with as much care as the parlor, the kitchen, the library, or any of the more important features of the house.

Fig. 8—Rosette. —Scale, 3 in. to the Foot.

When it is considered that the chimneys of a house must take away the products of combustion for all the fires in it, and must also contain the flues for ventilating the rooms, it will be seen that some thought ought be given to their construction. It may be taken as a rule, to which there should be no exception, that every sleeping room should have an opening into a chimney flue. This should be not more than 2 feet from the floor. By means of this opening, if the chimney stack is constantly warmed, good ventilation can at all times be secured. In fact, in any sleeping room that we have ever seen such an opening can be made to give as perfect ventilation as is needed. It must be understood that such an opening is needed even if the room is not to have a fire.

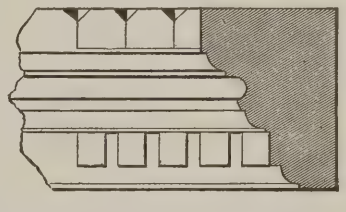


Fig. 9.—Detail of Cornice.—Scale, 3 Inches to the Foot.

The ventilating flues must be kept separate from those that are used for taking away the smoke, yet the latter must be used for heating them. The smoke flues must be made smooth inside, either by building a pipe into them or by carefully finishing them with plaster. The common fault of making them crooked should be avoided.

The size should be ample. A flue of 4 x 8 inches should never be tolerated. We do not now remember one that is wholly satisfactory, and do not think they can be made so.

If a room is intended to have a fire in it the smoke flue will answer for ventilation. The devices for bringing outdoor air into a room and heating it in order to obtain a fresh supply and assist in the ventilation, are entirely useless. If we provide in the chimney proper means for taking the foul air out of the room, there is no danger of a want of fresh air. It will come in through windows, doors and the very walls themselves, and a pure atmosphere will be the result of the perfect chimney.

Red-Wood Shingles.

From A. W. H., *Westfield, Mass.*—I desire to refer one or two questions about California red-wood shingles to the readers of *Carpentry and Building*. I have seen red-wood shingles that when first put on the walls and oiled looked very well, but after a few days or weeks, however, dark-colored shingles began to appear among them, and, accordingly the sides of the building looked very bad indeed. I desire to inquire if there is any way by which this difficulty can be overcome.

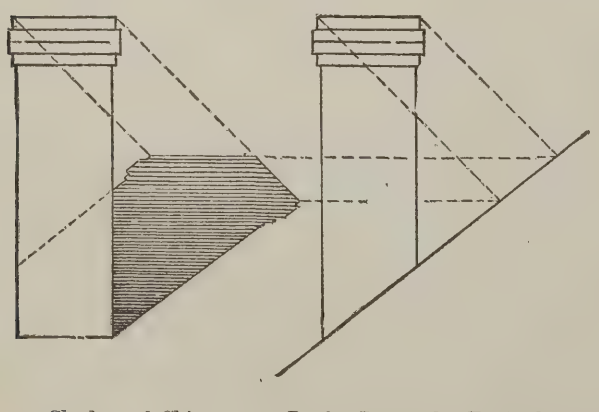
Building Paper Under Galvanized Iron Roof.

From D. S., *Gorrie, Canada.*—Will you kindly let me know if building paper laid under a galvanized iron roof will prevent it from sweating?

Answer.—We think a good quality of building paper or building felt laid under a metal roof of any kind will prevent the difficulty ordinarily known as "sweating;" and, further, that it is a good thing on general principles.

Problem in Projection.

From E. A. C., *Taunton, Mass.*—In the May number of *Carpentry and Building*, a correspondent asked how to find the shadow of an object on an inclined plane. For instance, that of a chimney on a roof. This can easily be done by using the side elevation of the chimney. To get the shadow of any line of a plane, we must get the shadows of the points at its extremities. Then by connecting these shadows we will have the shadow of the lines. Finding the shadow of a solid is exactly the same thing. For we must find the shadows of the lines which inclose the solids. Your correspondent probably understands that the rays of light are assumed to come over the left shoulder, so that their projection is seen at 45°. Take any point in the side elevation and project it at 45° to the roof. This will give the hight of the shadow on the roof. Now, take the corresponding point in the front elevation and project it down at 45° until it intersects

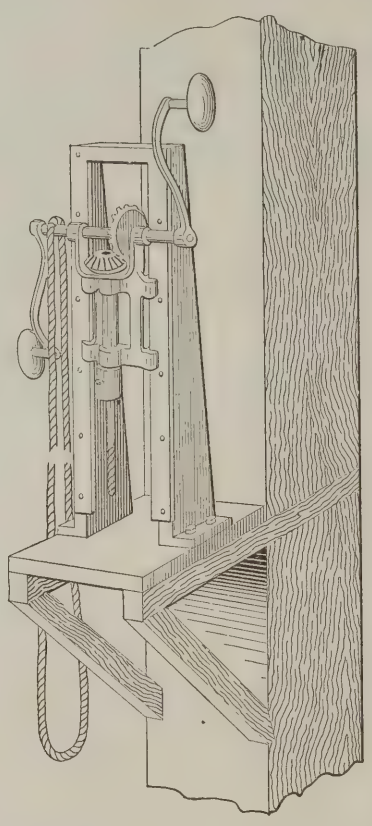


Shadow of Chimney on Roof.—Drawn by E. A. C.

with the horizontal line showing the hight of the shadow. This intersection will be the shadow of the point on the roof. In the same manner there can be found the shadows of all the points and lines, and those that form the boundary will form the outline of the shadow on the roof.

Improvised Drill.

From BRADS, *Wakefield, Mass.*—Your correspondent "J. D." has told how he made a drill in an easy way for use in a shop. I will give you an idea of one that I rigged up some time since. I took an old boring machine, removed the bed from the uprights,



Improved Drill.—Described by Brads.

and fastened the uprights against a post. I removed one handle, fastened a rope on the shaft long enough to reach nearly to the floor, and then, with my foot in the lower end of the loop in the rope, I could bear down enough to feed the drill. A machine rigged up in this way worked well enough to drill tires, and I used it for several purposes with satisfaction. I had a chuck made from a bit stock extension which held twist drills. I paid $1 for the old machine, and 40 cents for babbeting the box. It was not a very expensive machine, as your readers will see.

House Building in Trinidad.

From G. GEROLD, *Port of Spain, Trinidad.*—In the April issue of *Carpentry and Building* you were so good as to publish my design for cheap dwelling, which received honorable mention in the seventeenth competition last year. My intentions in the matter, however, have been misunderstood. In view of the fact that the design was to be published in an American paper, I endeavored to work it out in accordance with my conception of the American mode of building. Accordingly I introduced various features which would not be necessary in this climate. Among these may be mentioned the heating apparatus, which was of a kind to meet the requirements of the climate of the New England States. A cottage to be erected in Trinidad, where the average temperature is 30 Celsius, and where stoves and fireplaces are practically unknown, would be planned differently in this respect.

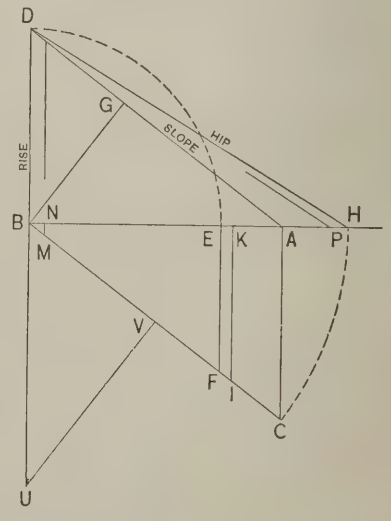
In this connection I would direct attention to some of the fundamental principles which govern house designing in this part of the world. Among these may be mentioned that the kitchen must never be put inside of the house, on account of the heat coming from it. The bath must not be arranged within the inclosing main walls on account of the dampness, which frequently causes fever. If you will kindly publish these few remarks in an early issue of the paper, you will save those who are familiar with the climate of Trinidad from blaming the paper for the "lapsus."

Steel Square Problems.

From F. LASCY, *San Francisco.*—I submit to you some steel square problems for splayed work: To construct on a base of any number of salient corners, a solid in which every two adjoining faces slope together toward the horizon forming a hip, all the sloping faces to have the same run and the same rise, of any lengths. To determine by the steel square on a line, all the angles that can be required for such constructions. First, draw to a proper scale, the run A B, the rise B D and the slope A D. This triangle is supposed to stand perpendicular to the plane of the paper. Construct the angle A B C = B = any angle whatever. If all the corners of the base are alike in degrees, B = 180° divided by the number of corners. If the corners are unlike in degrees, consider each corner by itself and make B = 90°, minus half the degree, of this corner. Draw A C and B C, which is always the seat line of the hip. A C B is always half the corner of the base. All lines drawn from the run to the seat line must be at right angles to the run.

By the steel square. Place the slope on the blade. Place A C (run tan. B) on the tongue. Mark along the blade for the face cut against the hip line of boards which have the direction of jack rafters. Mark along the tongue for the face cut against the hip line of horizontal boards; for the top cut of purlins; for the top cut of a miter box to miter the horizontal boards.

By the steel square. Place the slope on the blade. Place E F (rise tan. B) on the tongue. Mark along the tongue for the miter cut across the square edge of horizontal boards; for the down cut of a purlin;



Steel Square Problem.—By Fred. Lascy.

for the down cut of a miter-box to miter the horizontal boards, lying flat in the box. If the boards be not mitered, we require the butt cut across the square edge of boards. For this draw B G, at right angles to the slope; make B K = A G, and draw K I = run cosine tan. B.

By the steel square. Place the rise on the blade. Place K I on the tongue, and mark along the tongue for the butt cut across the square edge. Make B H = seat, then H D = hip line with its top and bottom bevels. For the diedral miter at right angles to the hip line, which is half the angle between any two adjoining sloping faces.

By the steel square. Place the hip line on the blade. Place E F (rise tan. B) on the tongue, and mark along the tongue for the

diedral miter. To back a hip rafter by a gauge mark. Make B n = half the thickness of the hip, and draw n m to the seat; from the toe of the hip rafter make H p = n m, and from p draw the gauge mark parallel to the hip. For a four-sided hipped roof, we may need the side cut across the top square edge of the hip rafter against the ridge. For this make B v = half the seat, and draw v u at right angles to the seat, to meet B u at right angles to the run.

By the steel square. Place Q U V (seat co-tan. B) on the tongue; place the hip line on the blade and mark along the blade for the side cut, shortening the hip according to the half thickness of the ridge, thus: If B n. = half thickness of the ridge, draw a distance, B m, parallel to the rise; where this line cuts the hip shows the shortening. For a square corner, B = 45°, Tan. B = co-tan. B = 1. In this case, tangents of B may be drawn or not.

Again, let the raking molding of a pediment = A D, which is to miter against as horizontal molding that forms with the run of the pediment any angle whatever. B = 90° minus half of this angle. The raking molding must be placed in the miter box with that part of the molding which is vertical when in position, against the side of the box.

By the steel square on top of the box. Place A G (run cosine) on the blade; place A C (run, tan. B) on the tongue, and mark along the tongue for the top cut of the miter box. Again, place the run on the blade; place the rise on the tongue and mark along the tongue for the down-cut of the miter box.

The miter of the horizontal molding equals one-half the corner on the ground plan. If the diagram A D B equals half the gable end of a rectangular building. To miter the raking planceer against the horizontal planceer, which slopes as the roof and runs along the eaves at right angles to the run of the gable, both planceers being in the same plane.

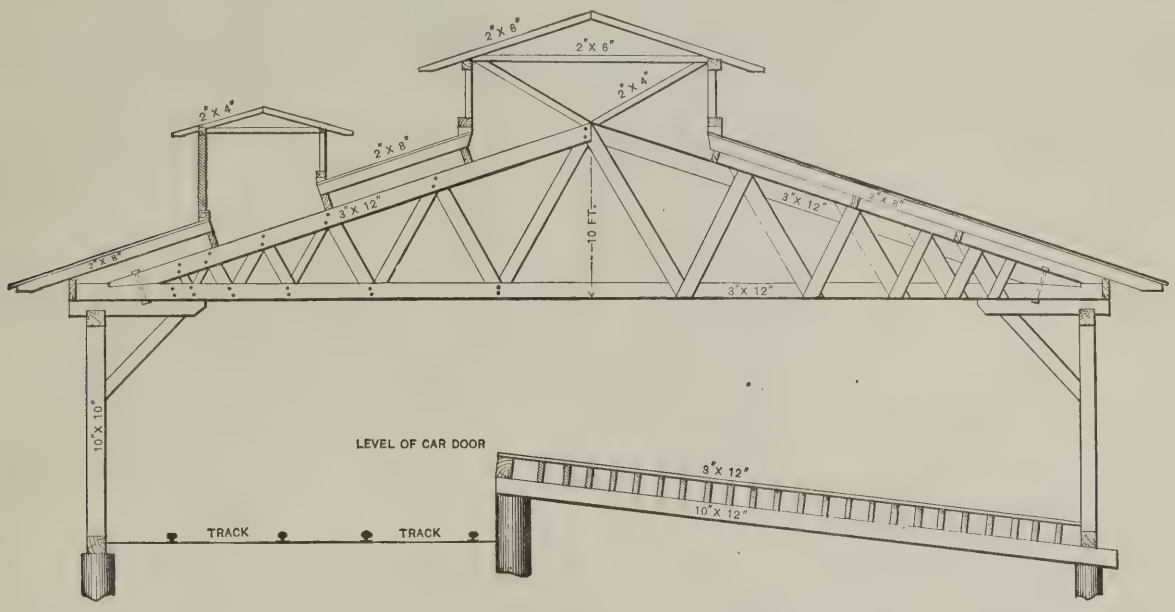
By the steel square. Place the slope A D on the blade; place the run A B on the tongue; mark along the blade for the raking miter; mark along the tongue for the horizontal miter. The horizontal planceer requires the wider board.

In laying off angles for splayed work, lines as long as possible and as few as possible are the essentials of accuracy and comprehension of the subject.

Roof Framing.

From E. B., *Norfolk, Va.*—I inclose a drawing that represents some of the framing of a warehouse finished a short time since for a railroad company in this place. The building is 400 feet long by 60 feet wide and occupies a pier. Boats can lie on either side of it, and there are double tracks for the cars. The size of the timbers used are noted in the sketch. All the dimensions are taken from the building after the parts were in place, for the original plan was not strictly followed. The truss was given about 1¾-inch camber, but, owing to the fact of different sized augurs being used, some of them being ⅛ inch or more large when in position, the truss lost about 1¼ inches. There were none of the tie-beams but what had some camber. Some of the men criticised this work, but when asked to indicate the weak point could only say the whole thing was temporary. The girt is framed in around the whole building. The ventilators, eight in number, occur at every third bent and were framed below and set on the sheathing. There is a slight drip to the sills and they are wedged at every jack rafter to hold them from canting. The tie-beam is in two pieces, 3 x 12 inches with 4 z 12 inch packing. The 5-foot piece in the middle was on account of the timber not being long enough. The braces were spiked with 8-inch galvanized wrought spikes. The plate and the braces in the truss are bolted; two bolts in each place. The first course from the sill is covered with smooth iron and the rest with corrugated iron. The roof is of tin. The material is of good hard pine throughout. If you deem this sketch of interest to the readers of *Carpentry and Building*, I hope you will publish it so that I may have the benefit of opinions from other members of the craft, I would like to have the weak part of this truss pointed out, and I should like to know how it might have been improved. I shall be glad to have you return the drawing of the truss, since the measurements on it are correct. I generally keep the dimensions of the work upon which I am engaged, taken as the building is finished.

Note.—It gives us pleasure to lay before our readers the essential portions of our correspondent's letter, accompanied by an engraving made from his drawings. The framing of the truss that he shows is not the most advantageous for use in such places, of all that might be employed. The construction is of a character that has been severely criticised in our columns in the past. We shall not stop to point out its objectionable features in this connection; but, instead, refer the whole subject to our readers, trusting they will give it such attention as its merits may command. We direct our readers' attention to the habit which our correspondent seems to have of keeping a record of the work upon which he is engaged. This certainly is advantageous, and will in the course of time give him a fund of information and a record of experience which will be invaluable.



Roof Framing.—Fig. 1.—Cross Section through Pier Shed.—Submitted by E. B.

Fig. 2.—Plan View of Truss.

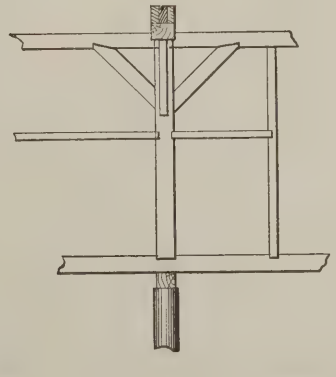


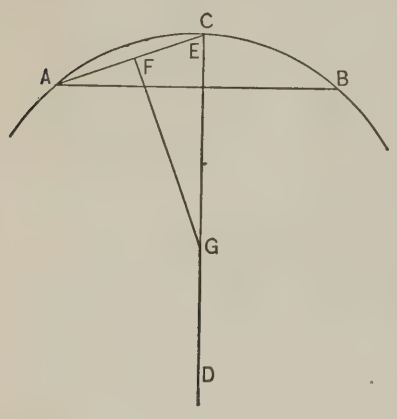
Fig. 3.—Side Elevation of Framing.

Cutting Rafters.

From M. A. W., *Evanston, Ill.*—I have just been comparing my plan of cutting rafters to one-third pitch with that of your Baraboo, Wis., correspondent. I notice but very little difference in the result, but, on the other hand, there is considerable difference in the method of getting the length of the rafter. Suppose a building is 22 feet wide, I multiply the width by 6, getting 132 feet. I place a decimal point between the first and second figures on the right, which gives 13.2. This is the length of the rafter I want—namely, 13 feet and 2 inches. Your correspondent fails to state where he gets his 2½ with which to multiply. By the same token, I have not explained where I get my 6.

To Find the Center of a Circle.

From J. W. Z., *Canton, Ill.*—The method given in the May issue of *Carpentry and Building* for finding the length of a circumference of a circle has prompted me to submit another one relating, however, to a different subject. The rule I have in mind I have put to frequent tests on the drawing



Finding Center of Circle.

board and have never found it to fail. Four lines only are necessary in applying the method, and for simplicity and accuracy, I think, it is unexcelled. As some of your readers may be interested in it, I submit it to them. Through any part of a circle or arc, draw a chord, A B, through the center of it draw a line, C D, perpendicular to it.

Mortise and Tenon Pattern Described by E. S.

Connect the points A and C by another chord and draw a perpendicular at its center point F. The intersection of the two lines F G and C D will be the center of the circle sought.

Note.—We are very happy to publish our correspondent's communication, as it may prove of interest to some of our readers. We do not attempt any further explanation, for the method is so simple that the short description he has given amply suffices. In fact, he has presented us with the rule in most common use for finding the center of a circle. He need not have taken the troubie to draw the smaller chord where he did, for any two straight lines intersecting the circumference or the arc would have served the purpose equally well. To express our correspondent's rule generally, it is simply to draw two straight lines through any part of a circle or arc, and at their middle points erect perpendiculars, the intersection of the two perpendiculars giving the center.

Handle for Tool-Box.

From S. F. B., *Wellington, Ohio.*—In answer to "T. B. G.," of Council Bluffs, I would say: Make a box as explained in the February number of *Carpentry and Building*, and straight dovetail the corners. Nail and glue each way. Put a handle on the side of the box constructed in the general manner indicated by the sketch submitted herewith. Managing it in this way, he will have a box that is light, strong and convenient. Such a box is very handy, particularly on a staging, and if it is necessary to reach up a little higher than can be done without assistance, a short board may be laid on the box and stood on. This is possible, because there is no top handle in the way.

Tool-Box Handle Described by S. F. B.

Mortise and Tenon Patterns.

From E. S., *Freeburgh, Ill.*—I have been greatly benefited by what has been published in *Carpentry and Building*, and therefore feel that I ought to do something in return. I send you a small sketch of a mortise and tenon pattern which proves very useful. It is made of ½-inch walnut wood, and is 24 inches long. The fence is 1½ inches wide, so as to project ½ inch on each side. It is fastened by screws to the main part. What I have shown may not be new to all the readers of *Carpentry and Building*, but I have never seen such an article used by others than my father and myself; hence, I submit it for what it may be worth.

Roof Construction.

From W. C. H., *Knoxville, Tenn.*—I inclose a sketch showing the framing of a roof. My partner contends that a roof framed as shown with the rafters notched on and supported by purlines and posts will be stable without the ties indicated by the dotted line—or, in other words, that the intermediate supports will relieve the outer wall from the thrusts of the rafters. My opinion is that unless one or both of the ties are used the entire concern will be liable to fall. Who is right?

Answer.—If two houses were built side by side, one with the roof framed without the ties and the other framed with the ties, and we were offered our choice, we should, without hesitation, prefer the one having the ties. We are under the impression that most of our practical readers will agree with us in this conclusion. The question that our correspondent raises is one upon which our subscribers can write to advantage. Many of them have encountered practically the question here raised, and can draw from their experience facts that will show the true principles to be observed in such cases. Therefore, having indicated our choice, we are disposed to refer the question to our readers for such discussion as they may see fit to give to it.

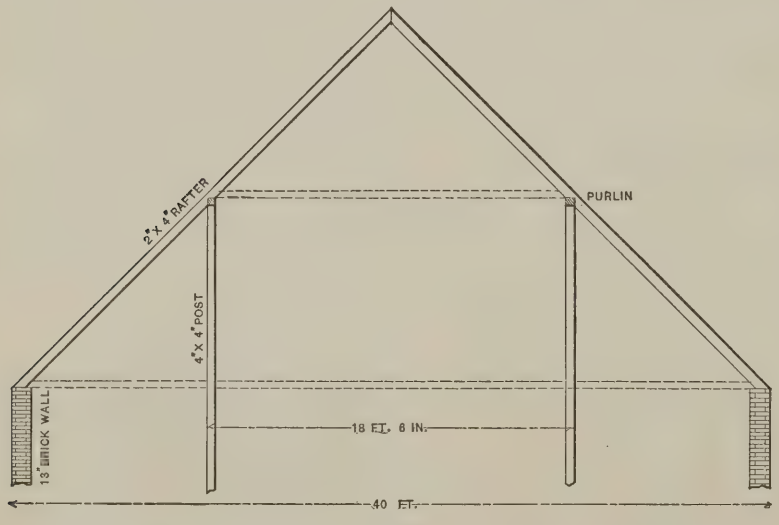
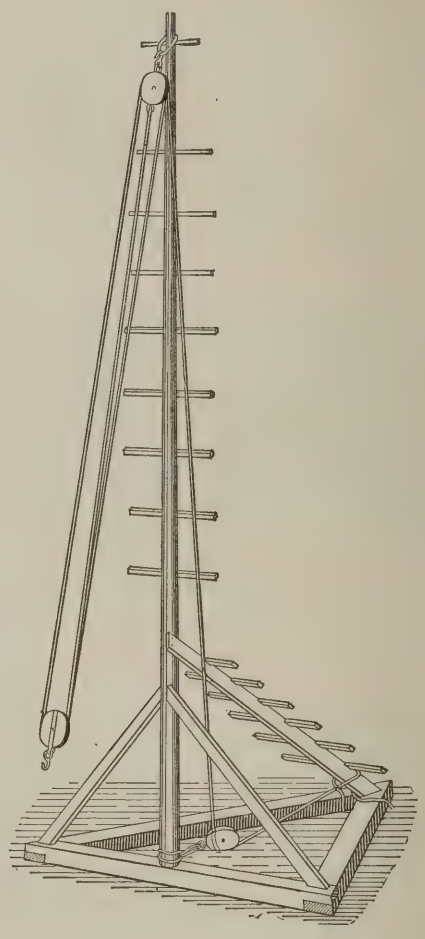


Diagram Illustrating Question in Roof Framing Proposed by W. C. H.

Raising Frames.

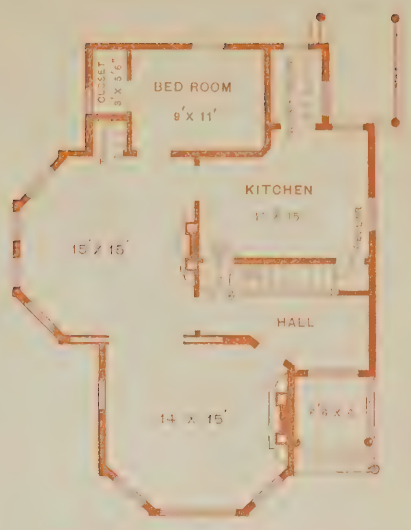
From E. B., *Norfolk, Va.*—I notice in the March issue of *Carpentry and Building* an inquiry entitled "Block and Tackle." I think the point is worth the attention of some of the practical readers of the paper, for raising is a very important part of heavy framed buildings. Very few mechanics can tell just what time and expense will be involved in raising a heavy piece of work. Some four years since I was engaged on a large job, which took eight or ten men one day to get a trussed rafter up and bolt it in place. I have just finished another job in which four practical riggers raised the 24 rafters inside of two and a half days. They had a carpenter to fasten the stays, &c. This indicates the difference between intelligent labor and proper provisions for doing the work, and the reverse. I inclose a sketch of what I have found to be a quick and safe hoisting rig; something that is light and easily moved. I first saw it used by some Germans seven years since. I do not think much of arrangements of this kind that employ a horse to do the hauling. The only exceptions would be in case a horse could be obtained that had been working on the dock, or is otherwise familiar with the work. At times it is necessary to suspend the truss for a moment or so; and if the horse is not accustomed to the work, it is uncertain whether he will hold the strain or not. I would advise your correspondent to get an 8 or 10 inch block, since the larger



Derrick for Hoisting Framing Described by E. B.

Front Elevation of House, by A. L. Myers, Lincoln, Neb.

Scale 1-8 inch to the foot.



FIRST FLOOR PLAN. Scale 1-16 inch.

SECOND FLOOR PLAN. Scale 1-16 inch.

Side Elevation. Scale 1-8 inch to the foot.

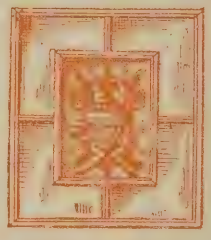
Designs for Overmantels.

Fig. 1.—Library Overmantel.

Fig. 8.—Pillar.

Fig. 9.—Front of Shelf Bracket.

Fig. 3.—Detail of Cornice.



Figs. 4 & 5.—Alternative Designs for Panels under side shelves.

Fig. 6.—Section of Cornice.

Fig. 7.—Base Moulding.

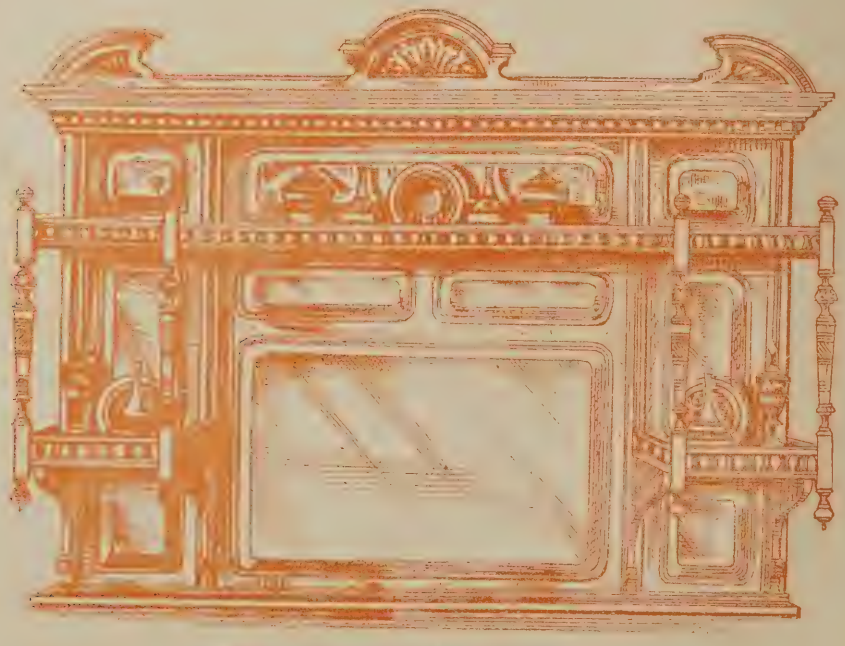
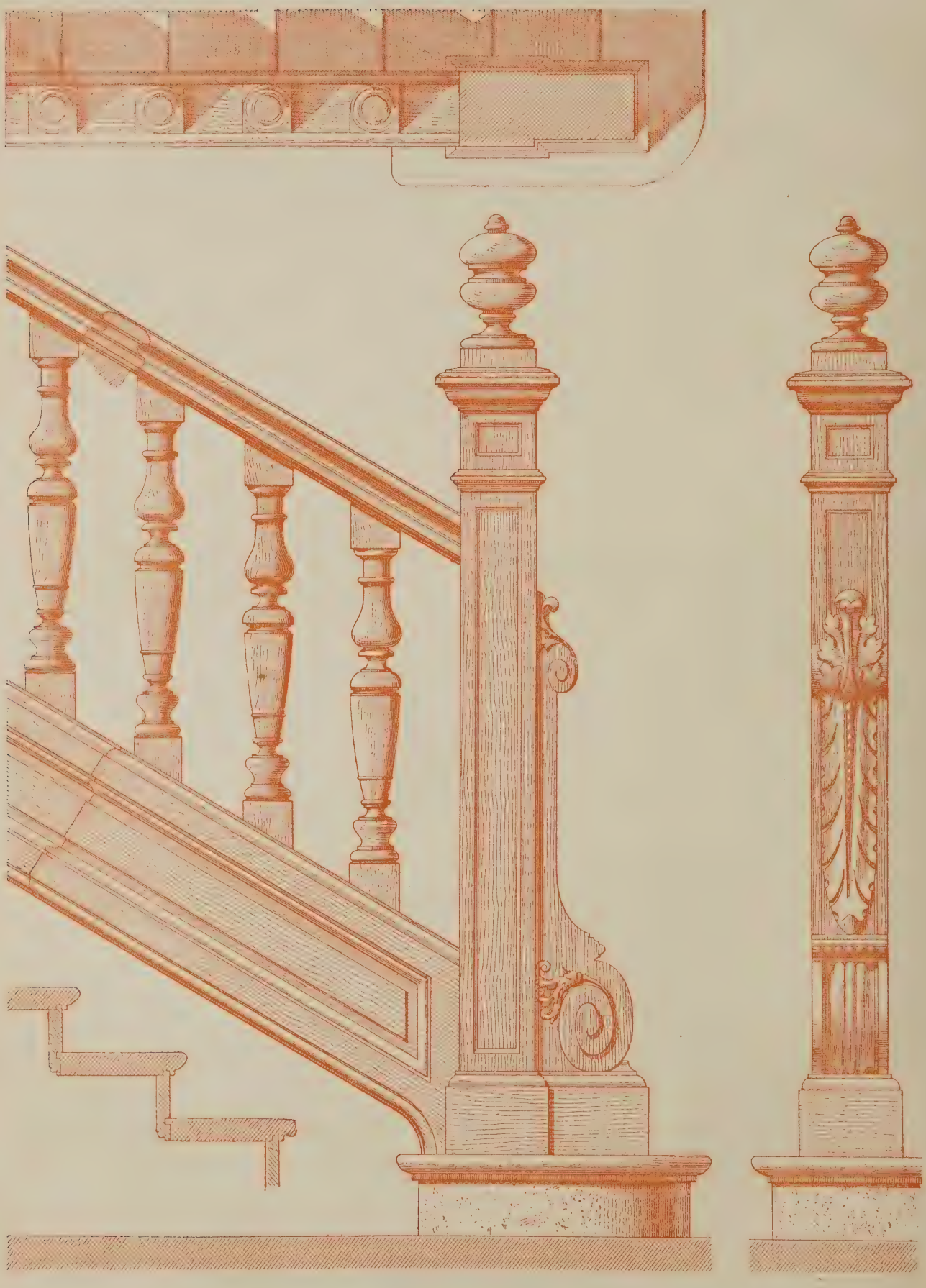


Fig. 2.—Alternative Design.

Ornamental Designs for Wall Anchors in Wrought or Cast Iron.

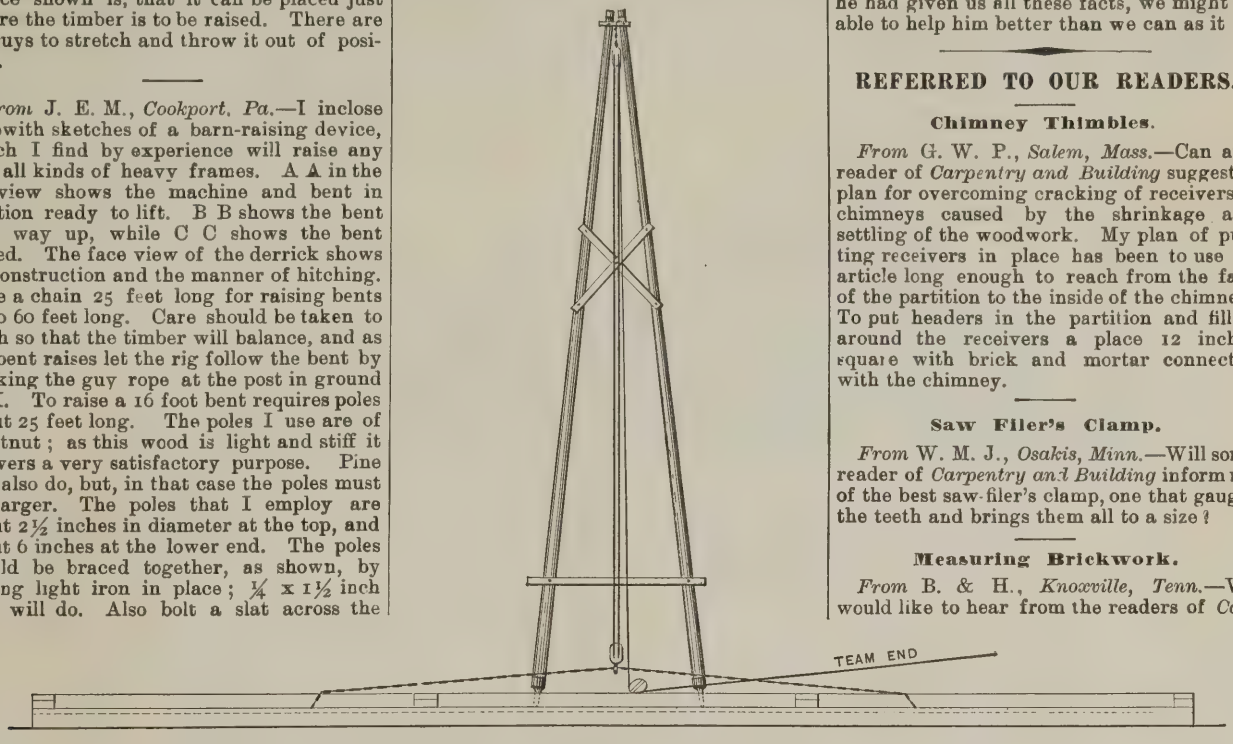
Designs for Carvings, by T. G. Jackson, M.A., Architect.



Design for Staircase, by M. Boizot, Architect, Paris.

the pulleys the easier they work; and to use rope anywhere from 1 inch to 1¼ inches in diameter. Rope of this size takes great weight to strain it, and therefore it will last a good length of time. Referring to my sketch, would say that one advantage of the device shown is, that it can be placed just where the timber is to be raised. There are no guys to stretch and throw it out of position.

From J. E. M., *Cookport, Pa.*—I inclose herewith sketches of a barn-raising device, which I find by experience will raise any and all kinds of heavy frames. A A in the sideview shows the machine and bent in position ready to lift. B B shows the bent half way up, while C C shows the bent raised. The face view of the derrick shows its construction and the manner of hitching. I use a chain 25 feet long for raising bents 50 to 60 feet long. Care should be taken to hitch so that the timber will balance, and as the bent raises let the rig follow the bent by slacking the guy rope at the post in ground at X. To raise a 16 foot bent requires poles about 25 feet long. The poles I use are of chestnut; as this wood is light and stiff it answers a very satisfactory purpose. Pine will also do, but, in that case the poles must be larger. The poles that I employ are about 2½ inches in diameter at the top, and about 6 inches at the lower end. The poles should be braced together, as shown, by bolting light iron in place; ¼ x 1½ inch iron will do. Also bolt a slat across the lower ends by which to move the machine. The blocks are double—in other words, are constructed with two shafts, and are provided with hooks and swivels. The upper block must have a ring or link on the lower end to secure the end of the rope. I use ½-inch Manila rope. I use single block to anchor.

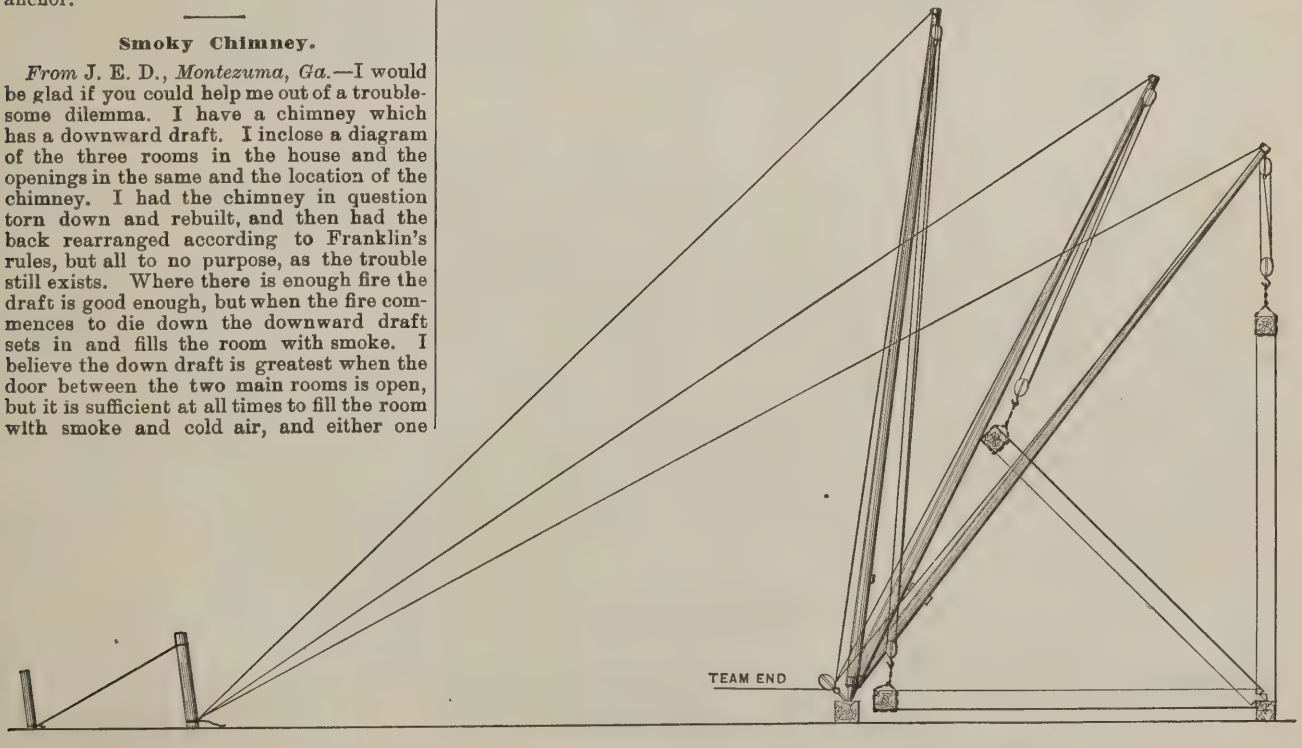


Front View of Derrick for Raising Frames Described by J. E. M.

Smoky Chimney.

From J. E. D., *Montezuma, Ga.*—I would be glad if you could help me out of a troublesome dilemma. I have a chimney which has a downward draft. I inclose a diagram of the three rooms in the house and the openings in the same and the location of the chimney. I had the chimney in question torn down and rebuilt, and then had the back rearranged according to Franklin's rules, but all to no purpose, as the trouble still exists. Where there is enough fire the draft is good enough, but when the fire commences to die down the downward draft sets in and fills the room with smoke. I believe the down draft is greatest when the door between the two main rooms is open, but it is sufficient at all times to fill the room with smoke and cold air, and either one makes it very undesirable indeed. If you can offer any suggestions that will help me out of this trouble I shall be under many obligations.

Note.—The draft which our correspondent incloses represents the floor plan of three rooms. One measures 17 x 17 feet, the second 12 x 17 feet, and the third 8 x 8 feet. These three rooms open out of a hall running east and west. The smoky chimney is located in the second room above described. Out of this room there is a door into each of the adjacent rooms, also a window looking to the east. The exposure of the room, as we understand the draft, is on the south. Our correspondent does not state whether these rooms are on the first floor of the house or on the floor above. From the fact that the smaller of the three rooms described is marked bathroom, we infer the rooms are located on the second floor of the house. What the shape of the house is, what the exposure of the chimney may be, whether the chimney extends to a hight equal to the hight of the comb of the roof, or whether there are adjacent buildings higher than this, we are not informed. We do not know just what Franklin's rules may be, to which our correspondent refers. But, if he has constructed the chimney in accordance with any well-recognized rules, and there are no flue openings in the shaft, the difficulty must be on acconnt of the hight of surrounding buildings, or some other similar cause. If he had given us all these facts, we might be able to help him better than we can as it is.



Side View of J. E. M.'s Derrick, Showing Pole in Different Positions.

REFERRED TO OUR READERS.

Chimney Thimbles.

From G. W. P., *Salem, Mass.*—Can any reader of *Carpentry and Building* suggest a plan for overcoming cracking of receivers in chimneys caused by the shrinkage and settling of the woodwork. My plan of putting receivers in place has been to use an article long enough to reach from the face of the partition to the inside of the chimney. To put headers in the partition and fill in around the receivers a place 12 inches square with brick and mortar connected with the chimney.

Saw Filer's Clamp.

From W. M. J., *Osakis, Minn.*—Will some reader of *Carpentry and Building* inform me of the best saw-filer's clamp, one that gauges the teeth and brings them all to a size?

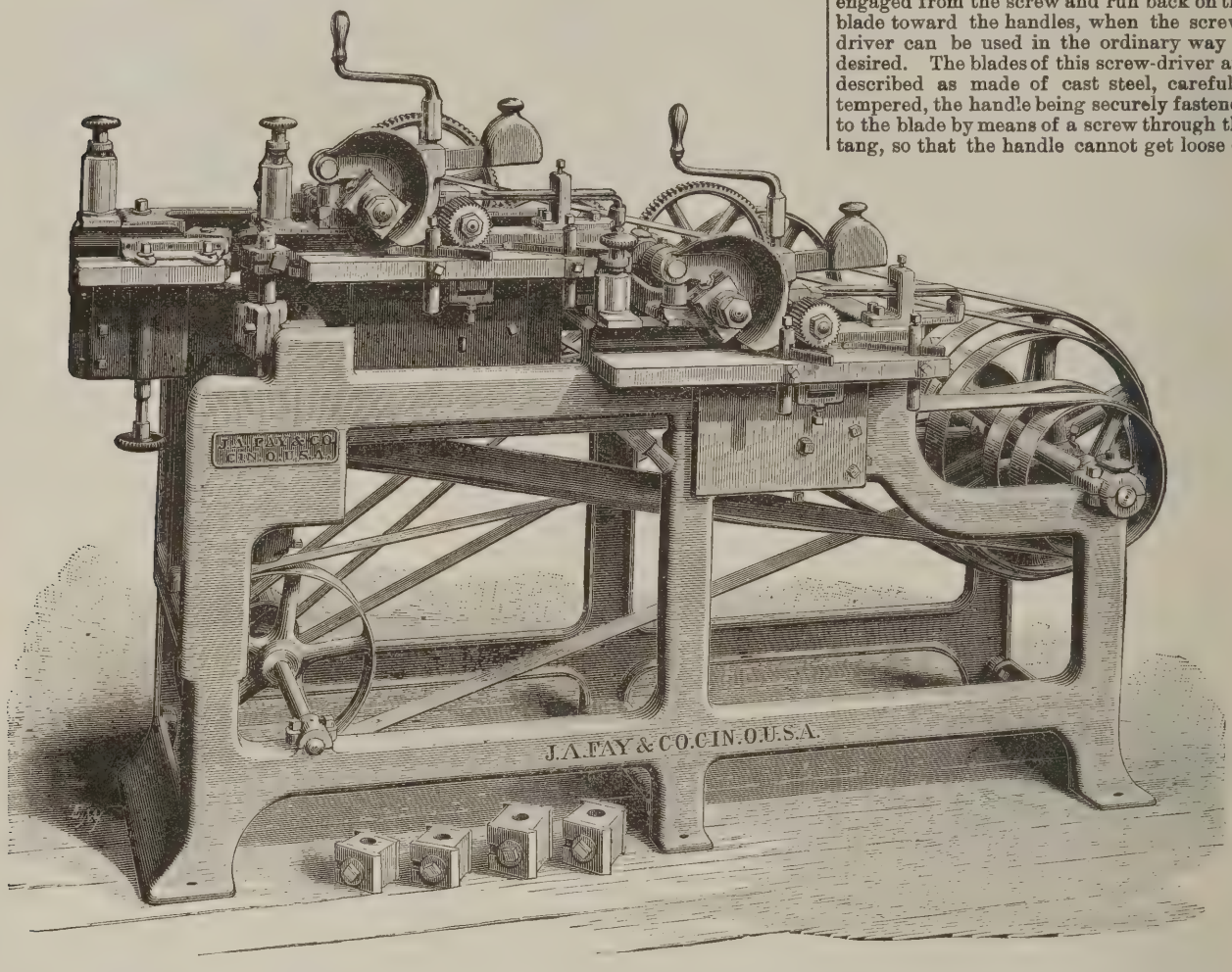
Measuring Brickwork.

From B. & H., *Knoxville, Tenn.*—We would like to hear from the readers of *Carpentry and Building* in regard to the rules for measuring and calculating brickwork in their respective localities. Is it customary to measure angles twice? Is it customary to make deductions for openings, such as doors and windows? In measuring piers and chimneys, is it fair to add the thickness to the breadth and multiply again by the thickness? For example, in a pier of two bricks or 18 inches broad by one brick, or 9 inches thick, is it customary to add the 18 inches and 9 inches together and multiply the product 27 by 9, or is it rulable to calculate 14 brick per square foot for a one-brick wall, multiplying by the given hight?

NOVELTIES.

Double Blind Slat Planing Machine.

J. A. Fay & Co., of Cincinnati, are directing attention to the double blind slat planing machine, shown in Fig. 1 of the engravings. It is described as a machine that will dress all four sides of the slat with the grain, and, at the same time, produce perfectly smooth work. The statement is made in the circular issued by the makers, that at least 30 per cent. of the slats worked on the regular four-sided molding machine, where one side is dressed against the grain, prove defective. Without the use of a slat planer like the one illustrated, the only way to save loss is by passing the slats through the molding machine twice. By this machine, it is claimed, every slat can be planed smoothly and accurately by once passing through. Referring to the design, it will be noticed that there are two tables, one placed just before and in advance of the other. These are raised and lowered by hand-cranks, as shown. The material is fed over the first table and under a cutter-head that dresses one of the sides. As it leaves the cutter-head the operator reverses it endwise and passes it under the feed-rolls above the upper table, where it is carried to cutter-heads that finish it on the opposite side and edges. Referring to the features of construction, the makers direct attention to the fact that the frame is strong and substantial, with the counter-shafts suspended in it at such a distance from the cutting spindles as to give good lengths of belts. The cutting spindles are of steel, run in long self-lubricating bearings. They have the necessary adjustments to suit different classes of work. The feed-rolls are of good diameter, are strongly geared, and have spring pressure which yields to varying thicknesses of material. Each cutter head is provided with the company's patent bonnet and pressure bar, which can be swung out of the way for ready access to the cutters for the purpose of removal or adjustment. Narrow heads and cutters for sticking sashes, small moldings, trunk slats and the like can be used if desired.



Novelties.—Fig. 1.—Fay's Double Blind Slat Planing Machine.

The Unique Screw-Holding Screw-Driver.

The Unique screw-holding screw-driver is manufactured by Wallen & Nesbitt, for whom the Alford & Berkele Company are sole agents, 77 Chambers street, New York. It is made under Wallen's patent. The illustration, Fig. 2, is full size and represents the special features of the tool. It will be observed that on the blade of the screw-driver there is a sliding clutch, the object of which is to hold the screw steadily in place while it is being inserted, the screw-driver revolving freely, and the screw thus conveniently turned in. It will be perceived that this clutch is easily opened so as to permit the screw to be readily put in place and also permitting the removal of the clutch when the screw is nearly driven home. The convenience of this device in inserting screws without the aid of a gimlet, and in inaccessible places, will be appreciated. It is obvious that the clutch can easily be disengaged from the screw and run back on the blade toward the handles, when the screw-driver can be used in the ordinary way if desired. The blades of this screw-driver are described as made of cast steel, carefully tempered, the handle being securely fastened to the blade by means of a screw through the tang, so that the handle cannot get loose or the blade pull out. The blades are six inches in length, the entire length of blade and handle being 10 inches. Information in regard to the prices is given in the Trade Report.

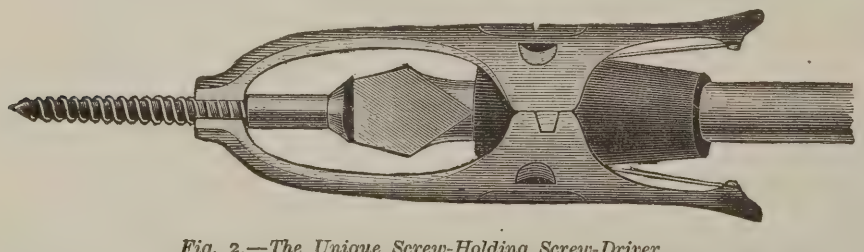


Fig. 2.—The Unique Screw-Holding Screw-Driver.

Palmer's Pulley Mortise Gauge.

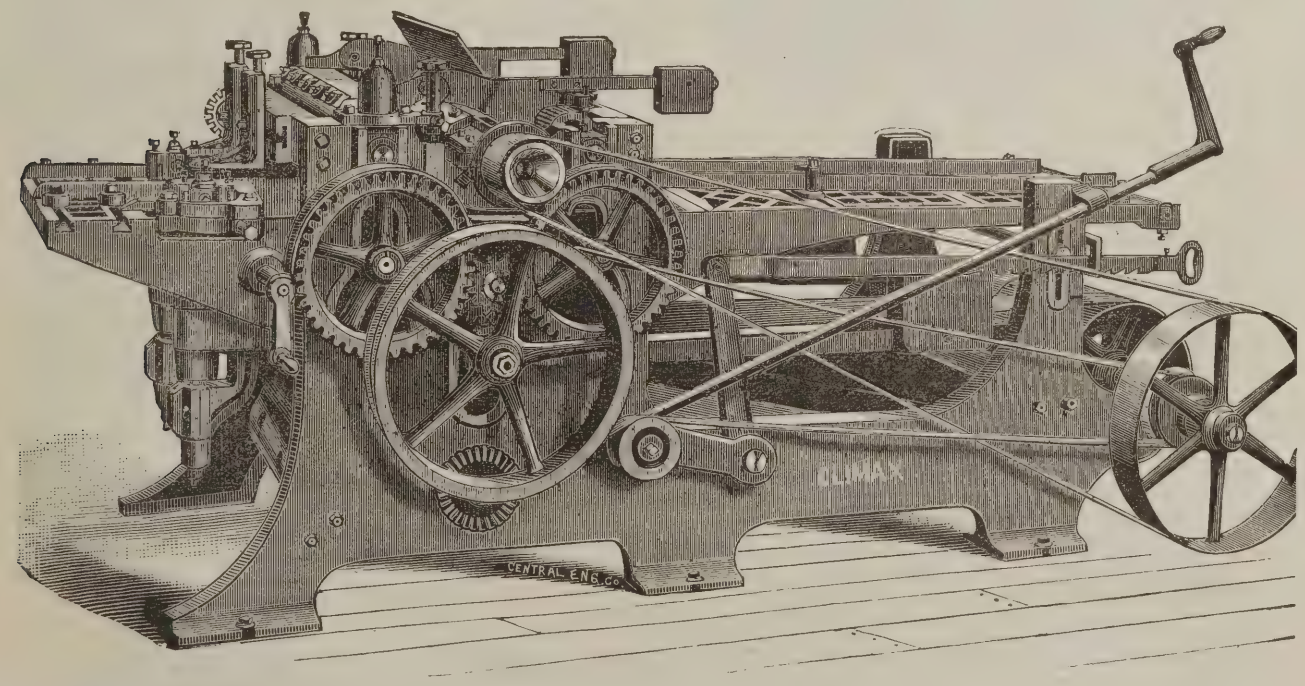
In Fig. 3 we illustrate a new device, put upon the market a short time since by the Palmer Mfg. Company, Troy, N. Y., for use in inserting their well-known styles of sash pulleys. These have already been illustrated in our columns, and, as our readers know, are made to fit the mortise formed by conjoined auger holes. For each size and style of these pulleys different spaces between the hole centers are required, to lay off which they are provided with projecting spurs, properly spaced, which, by means of slight pressure, are indented into the wood, indicating the point at which to start the bit. The gauge is to indicate the proper location of the mortise, and will be readily understood by referring to the cut, which shows a plan view of the top of the jamb with a gauge in its proper position. When so placed, the pulley bearing its markers is placed in the

Fig. 3.—Palmer's Pulley Mortise Gauge.

angle formed by the cross bar and the parallel bars, and its centers imprinted as above described. The gauge is instantly adjustable for sashes from 1⅛ to 2 inches thick. The company claim for this device, first, that it saves its cost several times in a day's use; second, that by its use a boy can mark the jambs as fast as a man can remove them. They call attention to the fact that one gauge is sufficient for all sizes and styles of pulleys, and there is no liability of using the wrong markers, as there would be if the marking spurs were a part of the device. The gauge is made of malleable iron, and is, therefore, durable. It is neatly finished.

Climax Planer and Matcher.

Fig. 4 illustrates a new planer and matcher with lowering bed, manufactured by C. S. Clunn & Co., 915 Sansom street, Philadelphia. The makers state that in designing this machine their aim has been to excel in the way of strength, handiness, capacity, durability and workmanship. The machine is built upon the interchangeable plan. The main or top cylinder is made from a solid steel forging, with all four sides slotted. It has a self-oiling device, also a tallow cup, and the bearings are lined with the best anti-friction metal. It is driven by two 4 inch belts. Pressure bars are provided on either side of the cylinder, and are arranged for surfacing flooring, making novelty siding, doing beading and other similar work. The front pressure-bar or chip breaker is adjustable to or from the cylinder to insure smooth working on either hard or soft woods, and so arranged that if forced up by a heavy cut it will not come in contact with the knives. It is fixed so as to swing clear of the cylinder for sharpening or setting the knives for any style of work. The four feed rolls are powerfully geared and are fitted with improved expanding gearing. They will work up to 8 inches in thickness. The front feed roll is so arranged that the stock receives an even pressure by weights, no matter how wide or narrow the board may be. It is immaterial if the board is thicker on one edge than the other, as the roll is not limited to any depth of cut. Two rates of feed are provided, and changes can be instantly made from one to the other without stopping the counter-shaft. The back or out-roll has a scraper and oil box, and receives its pressure from large steel springs. The rolls are so put in the bed as to do away with the loose plates in front and at the back of the rolls, and in a manner to make the bed much stronger than the old plan. The bed is dovetailed to the frames, and so arranged with gibs that any wear resulting from raising and lowering the bed can be taken up. The matcher frames are hung on a heavy steel bar, and are adjustable to work flooring any width, up to 14 inches, and their attachments may be swung or dropped out of the way when changing from flooring to surfacing. The change is accomplished in a very brief period of time. The machine will surface 18 inches wide without removing the long guide. Still other interesting features are described by the makers in a special circular which they have issued relating to this machine.



Novelties.—Fig. 4.—Climax Planer and Matcher.—C. S. Clunn & Co., Philadelphia.

Square-Hole Auger.

Many of our readers will recall an illustration of the original of the machine shown in Fig. 5, which appeared in our columns in our issue for March, 1885. Since the date

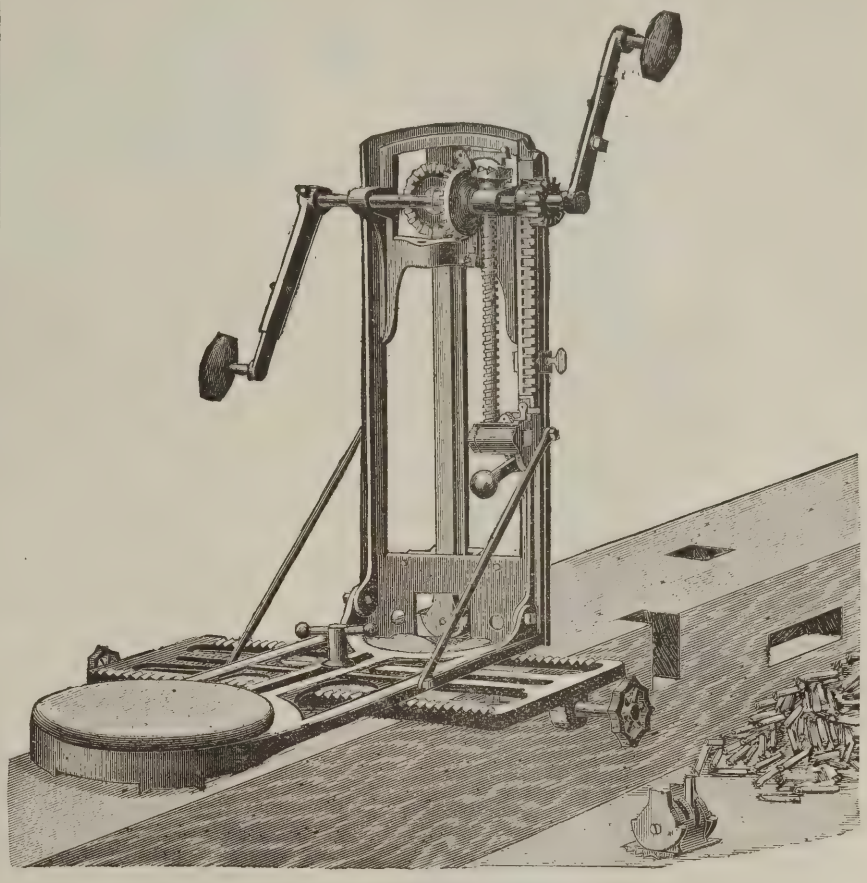
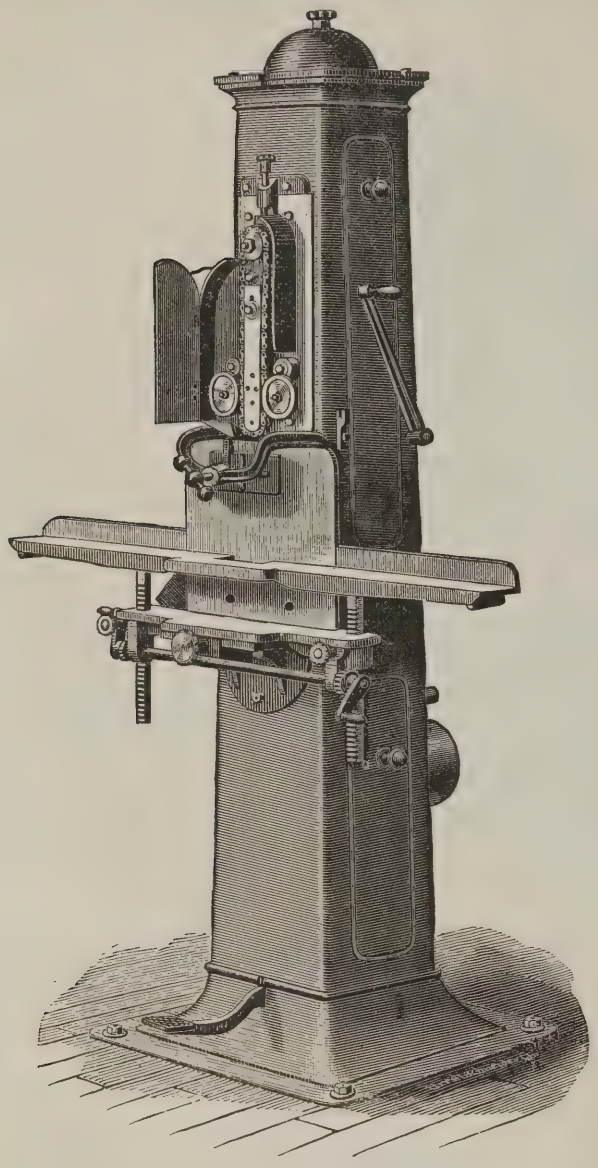


Fig. 5.—Square-Hole Auger in its Improved Form.

referred to the device has undergone a very thorough overhauling. Many of its parts have been improved in form and construction. Better material for their manufacture has been secured, and the machine is now offered to the trade by William P. Walter's Sons, 1233 Market street, Philadelphia, in a form to give satisfaction. The machine has the advantage of being portable, and it does the work that is ordi-

narily accomplished by the combination of mallet and chisel. In appearance it is somewhat similar to the common boring machine used by carpenters in framing. Power is applied to it in the same way. Instead of using the round auger, however, a squaring tool is used, the construction of which will interest our readers: To a brass



Novelties.—Fig. 6.—Douglas Mortising Machine.

socket that moves up and down in the mortise, there is attached at the upper end a double eccentric, which is connected by two steel rods to a cutter-head fastened at the lower end of the brass socket. To the underside of the cutter-head is attached a double-edged knife, which is provided at the end with parallel cutters on the underside, which cut the end of the chip before the knife shaves it out. The knife thus adjusted by means of the double eccentric and cutter-head is made to oscillate and cuts from the center outward and upward; and, accordingly, produces a square hole with the sides and corners smoothly cut. The machine in its perfected shape is provided with a positive feed, and cuts a hole 2 x 2 inches. This may be enlarged, in either direction, by moving the machine as required. By reference to the illustration, it will be seen that gains can be cut as well as mortises. Very complete instructions have been issued by the firm above mentioned for setting up and operating this tool.

Douglas Mortising Machine.

The improved form of Douglas Mortising Machine made by the Chicago Mortising Machine Company, Nos. 123 and 125 West Washington street, Chicago, Ill., is shown in Fig. 6 of the engravings. The machine is attracting attention among the manufacturers of doors, furniture, &c., on account of the accuracy and perfection of its work, and the rapidity with which it will make clean-cut mortises, especially in hardwood. The device seems to meet a want that has been seriously felt—namely, a machine that will make a smooth and accurate mortise, and at the same time thoroughly clean out the chips as it goes, at whatever depth the mortise may be sunk, whether part way or entirely through the lumber. The methods of mortising by other machines, if it extends through the stile, is to mortise part of the distance from one side; then to turn the work over and finish from the opposite side. It often occurs by this method that the mortises do not meet accurately which leaves a slight shoulder, or offset, at the point of meeting, and in such case, if the tenon is made to fill sufficiently well to make a glue joint or good, firm work, it is liable to split the stile. With this new machine the mortising is done entirely from one side, and any tenon of equal size from the end to the shoulder that will enter the mortise can be safely driven home, and thus secure substantial results. The chief advantage, however, is obtained in making mortises which do not extend through the work, called blind mortises. The machine can be set to mortise at any required depth, and the mortises will be uniform, accurate and clean. It is claimed by those who are using this machine that in blind mortising it not only does better work, but that one man with it will make from four to six times as many mortises in a given time as he can make by the machines and mortises in general use. The mortising is done with an endless chain of tempered steel cutters, which is driven by a sprocket-wheel on the driving shaft, and the lower end is held rigidly by a steel bar in which there is a tempered roller upon which the chain is made to run. The bar and sprocket-wheel shaft are attached to a sliding crosshead which travels up and down under the control of the workman. The body of the machine is a hollow, cast-iron pillar provided with suitable doors to get access to the driving and feeding works, which are located inside and safely inclosed from dust. On the front is the adjustable bed for holding the work. By pressing upon the lever at the base of the machine, a rapid rotary motion is transmitted to the chain, which feeds down through the work automatically. It can be adjusted to mortise any required depth up to 8 inches, and will mortise any length from 2¾ inches upward. The lever on the side of the machine is used for feeding the cutters down by hand, and is found very rapid and serviceable for elongating the mortises to any desired length. The width of the mortise is regulated by the size of the chain. There are four regular sizes with each machine, and special sizes can be supplied when required.

The special point that has required attention in the construction of these machines is the manufacture of the chain and cutter. The aim has been to produce a chain of cutters that will be adapted to run over a sprocket-wheel at a speed of 2500 turns per minute, and, running at this speed, to cut hard and soft wood 10 hours a day for months without breaking or showing material wear. This the company claim to have accomplished. The various parts of the chain are made accurate and uniform by special machinery invented and manufactured for the purpose. The cutting edge of the cutters is hardened to the temper of a good firmer chisel, and the body is below a blue in order to give it the greatest tensile strength. The machine illustrated is the medium size or No. 2. The company are also manufacturing a No. 1 machine for mortising heavy timber, and a No. 3 for furniture and lighter work. They are also preparing the plans for a machine of this character to mortise wagon and carriage hubs.

Safety Dumb Waiter.

The Edward Storm Spring Company, Limited, of Poughkeepsie, N. Y., are introducing what they have designated as the New York Safety Dumb Waiter, a sectional view of which is contained in Fig. 7 of the illustrations. The engraving repre-

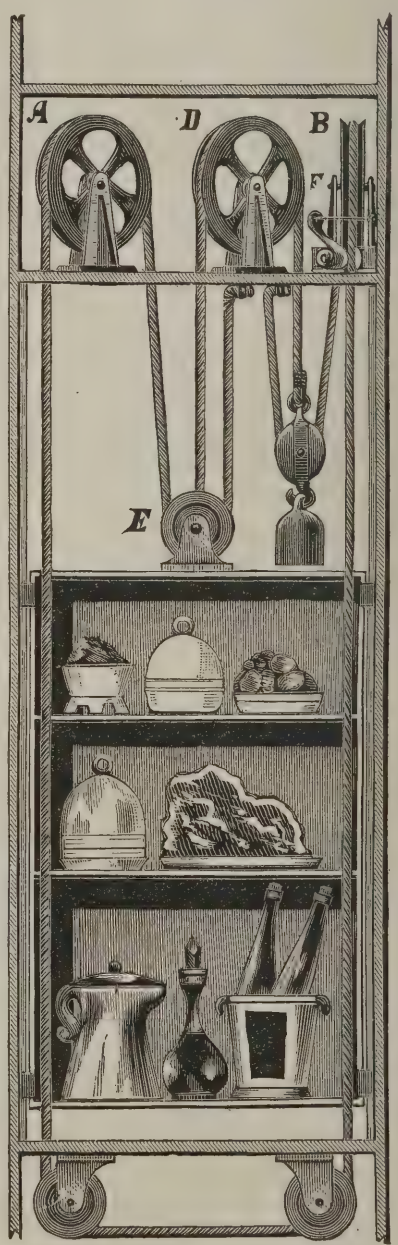
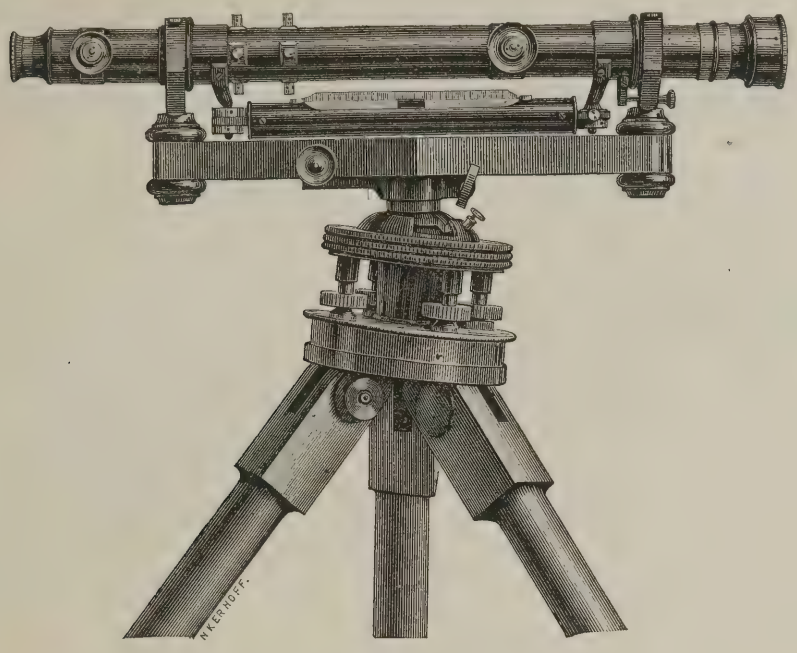


Fig. 7.—New York Safety Dumb Waiter.

sents the waiter adjusted in position, with ropes and counterpoise weight in place. The makers inform us that the car can be hung with only one wheel, E, as shown in the cut, or with two wheels for the purpose. Two wheels are furnished with each set of fixtures, and it is recommended that where the car of a waiter is over 20 inches wide, that two wheels be employed, thus distributing over the top of the car the fixtures through which the rope passes. A special feature of this device is that the

fixtures for any size waiter are the same in size. The waiter is provided with a safety rope, thus insuring against accident or breakage in case the hoisting rope gives away from long use. This is a desirable feature, and is said to be peculiar to the device here illustrated. The makers claim for this waiter that it is so simple as to be readily put up by any ordinary mechanic. It will also approach closer to the ceiling and come down nearer to the floor than many other waiters in general use. Each set of fixtures is provided with a clamp brake adapted to hold the car at any desired point when loaded beyond balance. The car moves with such ease that it is asserted that a child of ten years can operate it readily. It is noiseless, and it is free from parts liable to breakage. The ropes are always tight, the manner in which the counterpoise is attached allowing for both stretching and shrinkage. The manufacturers have issued a pamphlet showing, in addition to the illustration we present, horizontal cross-sections and general view of the wheels in position, thus making the mechanic familiar with the way in which the work is to be put up.



Novelties.—Fig. 8.—Gardam's Improved Wye Level.

Improved Level.

Figs. 8 and 9 represent an 18-inch improved wye level, just being put upon the market by William Gardam & Son, 96 John street, New York. The device has several features of improvement about it that render it of interest to architects, engineers, and all who have to do with leveling operations, whether about buildings or in running lines in connection with engineering work. The special feature of the device is the provision that is made for quick leveling and setting up on a very rough and uneven ground. The design of the upper part is similar to the regular wye level and contains the improvement which the firm above-named have put into the usual form of this article—viz., the clamp and tangent revolving with the telescope, long center telescope, and spirit level as close to the center as possible, improved clips to the wyes, &c. The design of the lower part of the present device, which is more clearly shown in the second engraving, is new, and contains improvements recently patented. Our second engraving shows in detail the construction, operation, and manner of detaching the upper part of the instrument from the parallel plates, and also shows distinctly the form of socket and the manner in which it is attached to the parallel plates. The clamping ring and spring catch are also indicated. In using the instrument, the operator proceeds as follows: After screwing the parallel plates to the tripod head, the socket B is inserted in the cavity provided for it, and is then turned to the left until the spring catch A drops over the edge of one of the flanges on the socket B. This is simply to prevent it being turned backward. The ring A is then screwed down, which causes it to grip the socket B firmly, which holds the instrument perfectly rigid and completes the preparation for use. By slightly unscrewing the ring A the instrument can be moved to any angular position at will. The amount of friction and bearing surface is so great that it is claimed there is not the slightest chance of the instrument shifting when being used. The simplicity of the device, the makers inform us, is so great that they guarantee that it cannot get out of order with ordinary care and use. The weight of the instrument is 12 pounds, and the tripod 7 pounds. The telescope is 18 inches long, and the object glass 1⅜ inches in diameter and of the highest magnifying power obtainable.

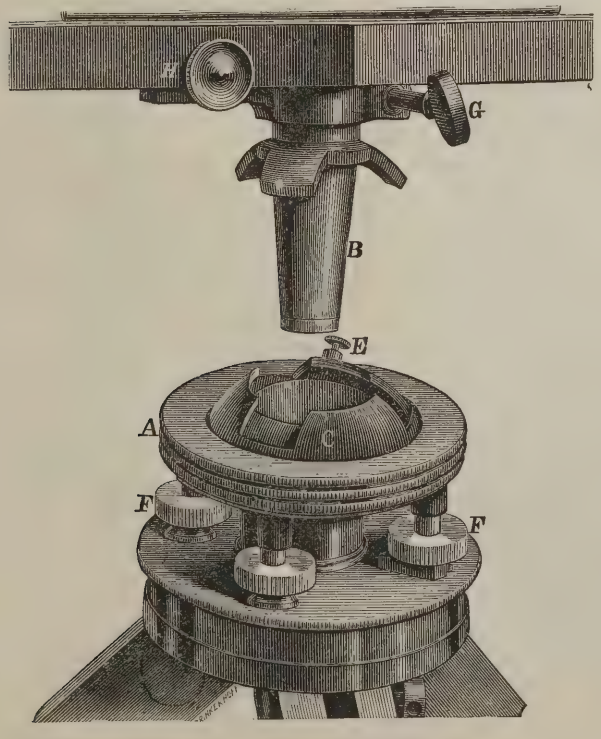


Fig. 9.—Detail of Lower Part of Wye Level.

The Empire Sash Pulley Gauge.

A sash pulley gauge manufactured by the Empire Portable Forge Company, Cohoes, N. Y., is shown in Fig. 10. It is intended for use in attaching sash pulleys, the cases of which are made to conform to the mortises in the window frames made by auger holes overlapping each other, this gauge being for the purpose of marking the exact centers of such auger holes. As shown in the accompanying illustration, it will be perceived that the gauge is placed in the parting groove of the window frame, and has a stop at the end of the bar which is placed in the gane, when a light tap on the knob with the hand makes the requisite impression of the points in the jamb, thus giving fine marks to bore by. The gauge is adjustable and will work for two sizes of pulleys, 1¾ and 2 inches, by simply taking off the thumb screws and reversing the markers, bringing the points down. The point is made by the manufacturers that this device very greatly facilitates the insertion of the pulleys, it being stated that a man can mark 100 jambs in 10 minutes, while the old way of marking would take, it is estimated, three hours.

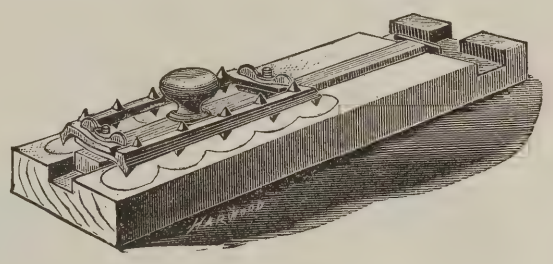


Fig. 10.—Empire Sash Pulley Mortise Gauge.

Gong Door Bell.

The Russell & Erwin Mfg. Company, of New York City, are putting upon the market the gong door bell, with push button, illustrated in Fig. 11 of the engravings. The appearance of the outside finish is not unlike that of the electric or pneumatic bells that are largely in use at the present time. The button, including its escutcheon, is manufactured in various styles, to agree with the hardware of the door. By pushing upon the button, the shaft or rod connecting with it is forced back in a way to compress the spiral spring shown at the left of the engraving. In moving forward it trips the trigger that

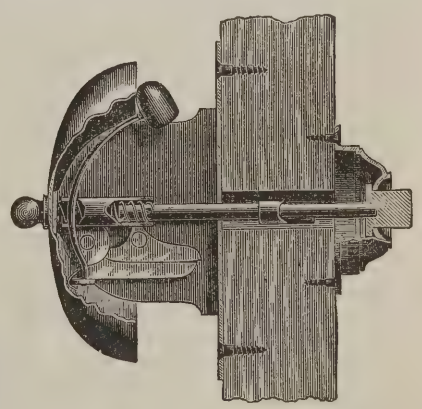
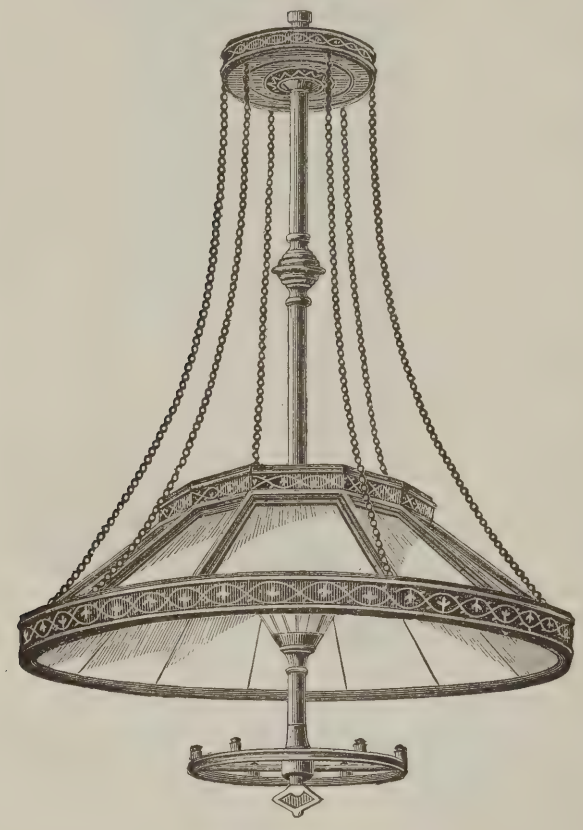


Fig. 11.—New Door Bell, Brought out by the Russell & Erwin Mfg. Co.

controls the hammer of the bell, and in returning to its normal position, by the action of the spring, the trigger is tripped a second time. Accordingly, a single push upon the button results in two quick, hammer-like strokes upon the gong. The gongs are struck up of steel and are handsomely plated, and have a very clear sound. The other parts of the bell are made of the best material, and the mechanism is so simple in character as to make the article very cheap, and yet is of a kind not likely to get out of order. The bells are furnished in different styles to suit the wants of the trade.

Church and Hall Reflectors.

The reflector shown in Fig. 12 of the illustrations is one of a series of new designs recently brought out by I. P. Frink, 551 Pearl street, New York. It is described as an ornamental suspended double opal glass or porcelain reflector. It is manufactured in sizes ranging from 18 inches to 96 inches diameter, and to accommodate from 4 to 80 burners. The catalogue from which this design is taken shows a number embodying the same principles of construction, but varying in the character of ornamentation and details of construction. In the general form above illustrated, these reflectors have been adopted in a number of prominent buildings throughout the country, among which may be mentioned the German Young Men's Association building, at Buffalo, one of the largest halls in the country; in Dr. Meredith's new church, in Boston, one of the finest churches in that city; Cornell Memorial Church, New York, and by the W. & J. Sloane carpet store, New York, one of the most elegant establishments of its kind in the United States. In the latter case, they are employed for lighting the entire store. We understand from the manufacturer that the double cone gives as much as one-third more light than the single cone reflector of the same class. Reflectors of this general kind are furnished plain, as indicated in the cut, or are trimmed with prisms in different styles, or are furnished in different ways resembling the silver plated corrugated glass reflector manufactured in the same establishment.



Novelties.—Fig. 12.—Frink's Double Opal Porcelain Reflector.

Barrett's Combination Roller Gauge.

A roller gauge put on the market by S. W. Davis & Co., 9 Custom House street, Providence, R. I., who are sole agents for its sale, is shown in Fig. 13. This gauge is composed entirely of metal, the head being gray iron and the beams Bessemer steel and graduated, and the whole finely polished and nickel-plated. It has, it will be observed, two beams, the shorter beam sliding into the head flush, adapting it for use as a single gauge. In place of a spur, rolls, which are described as made of the finest steel, are used, beveled to a fine edge, hardened, and revolving on a shank of hardened steel screws, enabling them to run over knots and roughness with ease and accuracy. As constructed, it will be perceived that this tool can be used as a single or double gauge, as for gauging thickness and width, and also for a tenon or mortise gauge. Another use which is suggested for it is in striking circles, one of the eight corners of the head resting on the wood for the center of the proposed circle, and the gauge being turned with the wheel revolving over the wood to make the circle. That the gauge can also be used for measuring depths is pointed out by the manufacturers. The tool is neatly and well made and finished.

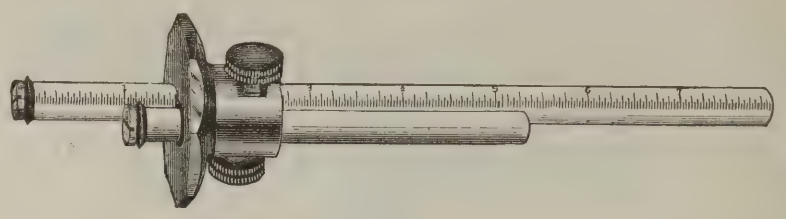


Fig. 13.—Barrett's Combination Roller Gauge.

The Security Sash Locks.

The Claflen Mfg. Company, Cleveland, Ohio, are making a line of sash locks which they name Security, one pattern of which is represented in the engraving given below.

Fig. 14.—Security Sash Lock.

The manner in which these sash locks are operated by a lever is indicated in the cut, which shows its position when the sashes are locked. This lever operates an eccentric plate with a helical top bearing surface. By this construction, when it is desired to lock the sash, a movement of the lever from its position parallel with the window sash to a position at right angles with the sash throws the bolt out the full distance required to fasten the window, and the further movement of the lever in the same direction to the position shown in the cut forces the bolt upward and at the same time draws the meeting rails together. These movements are accomplished without the aid of springs. The fact that the sash lock is not liable to get out of order is one of the points made by the company, while at the same time they allude to the simplicity of its operation and the manner in which it prevents the window from rattling, excludes dust and cold air, and locks the windows securely. These sash fasts are made in different sizes and finishes of iron and real bronze.

Excelsior Expansive Bit.

A new expansive bit, in which the cutter is readily clamped without the use of a screw-driver, is being put upon the market by Tower & Lyon, 95 Chambers street, New York. It is illustrated in Fig. 15 of the engravings. The cut on the left shows the special lever by which the cutter is held in place, swung open for the purpose of adjustment, while the cut at the right shows it in position for use. The convenience of adjustment secured by this feature of construction will be appreciated by our readers generally. The effect of wear is provided for by the manner

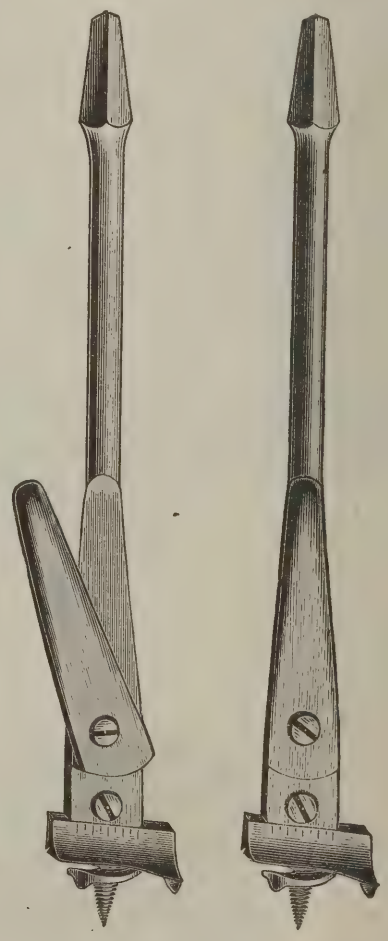
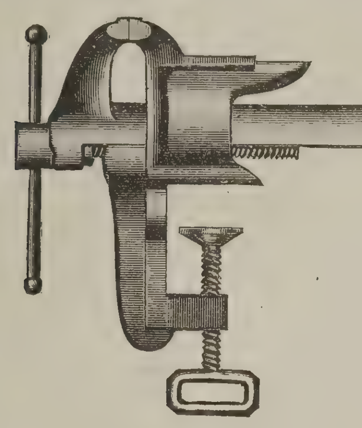


Fig. 15.—Excelsior Expansive Bit.

in which the screw holding the part against which the lever acts is inserted. A slight turn of the screw with the screw-driver tightens the clamp upon the cutter, so as to compensate for all wear or to hold it more or less tightly as circumstances may require. Two cutters are provided with the bit, one boring from ⅞ inch to 1¾ inch and the other from 1¾ inch to 3 inch. The tool is very neatly fitted, the graduations are very accurate, and the parts are so proportioned as to be strong and durable.

Clamp with Vise Anvil.

Moore & Barnes Mfg. Company, 103 Chambers street, New York, have recently put this article, which is represented in the accompanying illustration, on the market.



Novelties.—Fig. 16 —Clamp Vise and Anvil.

It will be observed that it is their regular anvil vise fitted with a clamp and thumb-screw, a feature which they are adding to all their present sizes. They have now ready for the market the No. 2½, which weighs 1¼ pounds. They allude to it as having steel screw and lever, steel thumb-screw with ball and socket point.

The Conroy Refrigerater Door Fastener.

P. J. Conroy & Co., 1605 Catharine street, Philadelphia, are manufacturing the door fastener which is illustrated in Fig. 17.

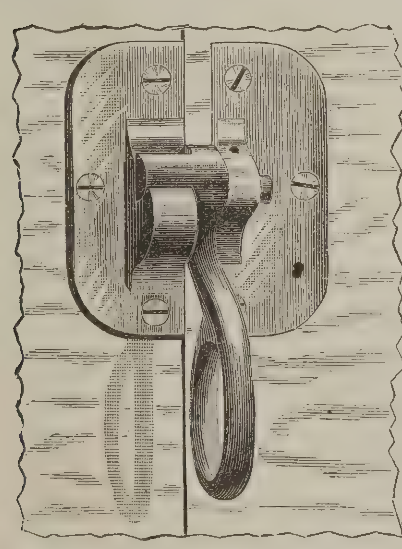


Fig. 17.—The Conroy Refrigerator Door Fastener.

From this illustration it will be perceived that the handle attached to the door terminates in a cam, the operation of which is such as to force the door tightly shut when the handle is in the position shown in the cut. The pressure thus secured is referred to as giving practically an air tight chamber. The form of the cam is such as not only to unfasten the door, but to force it open when the handle is raised, a feature which is alluded to as important in view of the liability of refrigerator doors to expand and bind from dampness. The point also is made that in all the pressure which is exerted to force the door shut there is none to press it down, thus avoiding causing the door to sag as in other fasteners. The simplicity of this device, the efficiency with which it does its work, and its neat appearance are other advantages mentioned by the manufacturers. Six sizes of these fasteners are made, and of materials and finish as follows: Japanned, galvanized, brass and nickel-plated. Those designated large and No. 1, are for packing-houses and breweries, Nos. 2 and 3 for butchers' and provision dealers' ice boxes, and Nos. 4 and 5 for small and family refrigerators. The manufacturers also make three smaller sizes of fasteners on the same principle to be used on closets, cupboards, showcases, &c., and to take the place of spring catches in general, over which it is claimed that they possess many advantages.

Apt Names for Bad Workmen.

Strikes bring out the technical slang of the trades, and particularly the opprobrious epithets with which the different classes of workmen distinguish the unskilled operatives who labor at the same trades. In most cases it will be found that these slang terms originate in some technicality of the trade. Thus the telegraphers call a poor operator a "plug," after the little metal implement which divides the switches on the keyboard, inasmuch as the plug or "key" is a comparatively unimportant part of the machinery. Printers designate an unskilled typesetter a "shoemaker" or a "blacksmith." The derivation of the former appellation is from the fact that a comopsitor who makes errors is obliged to correct them after the type is set up by taking out the misplaced letters and "pegging" the proper ones into their places. Tailors also use the word "shoemaker" to distinguish a poor hand, as an unskilled workman makes his stitches too far apart, and is therefore better adapted to sew leather, where he can punch the holes with an awl before putting the needle through. The appellation "blacksmith" is applied to a printer whose fingers are clumsy, and a jeweler also terms an unskilled worker at his trade a "blacksmith" for the same reason.

A term of opprobrium which was used by old New York printers to designate an unskilled compositor was the word "boarder," from the fact that a poor hand was generally a drinking man and spent his time loafing or "boarding" in liquor saloons. All striking trades-workers in common use the general word "scab" to distinguish workmen who take the place of strikers. The derivation is obviously from the fact that the scab is a morbid growth, and lives only at the expense of the well-being of the rest of the body. Shakespeare uses the word scab as a word of opprobrium, and Webster defines scab as "a mean, dirty, paltry fellow," which may have suggested the original application of the word to its present use. The printers and telegraphers, two of the most intelligent classes of workmen, are the only tradesmen who have invented names to particularize the scabs of their respective professions. Thus compositors call a scab a "rat," in contemptuous allusion to the rodents who infest printing offices. The telegraphers have only recently invented a term for scab operators. They call them "contumists," though the application is not of technical derivation, but is probably an attempt to manufacture a word from the Latin *contumœ*, the root of contumacious, to describe a stubborn and obstinate person.

The various names actors give to the unskilled members of their profession are familiar to most of the reading world. A poor actor is termed variously a "stick," "fakir," "statue," or "dummy." A "stick" or "statue" is, naturally enough, an actor who is awkward and stiff on the stage. The term "dummy" is derived from the fact that when a traveling company has not enough members in the company to fill up a large stage, men and women are employed to stand in the back with choruses or supernumeraries, and take no other part. They are called "dummies." "Fakir" is a generic term, and comprises those actors who lack talent and depend upon other resources. For instance, a comedian who makes faces is called a "mugger," and a tragedian who bellows is a "ranter," and both are "fakirs." The professors of the manly art are also apt in this style of nomenclature. They call a cowardly fighter a "duffer," and a weak, unskilled boxer, a "sand bag" or "stuff," the latter terms being derived from the contrivance upon which the pugilist does his practice.

Frozen vs. Kiln-Dried Flooring Boards.

A correspondent of the *Northwestern Lumberman* says: "Frozen lumber occupies a smaller space than the best kiln or air dried—that is, if two boards of the same size be taken green from the saw, one will contract more under the influence of extreme cold than the other will through any artificial drying. An instance of this character is thus stated: A gentleman, now old, remembers how his father determined to lay a floor, but the proprietor of the old-fashioned saw-mill on which the community depended for their lumber had no dry stock—nothing but green logs, which might be supposed to be frozen under the influence of the below-zero weather then prevailing. He was ordered to saw up those logs. The frozen lumber was taken just as it came from the saw, dressed off by hand, as usual in those days, and laid in the floor. Many years after the son, who was a builder, put up a house for his own use, and built it as well as he knew how. He paid particular attention to the flooring, and himself superintended the kiln-drying of the strips. But in spite of all his care the floors shrank, and in a few years showed wide spaces between the boards. On the contrary, the floor his father laid of frozen lumber, after 40 years of service, showed not a crack—a knife-blade could not be inserted between the boards, and it had always retained its perfect surface. The story is an interesting one as showing that woods have peculiarities which are understood by but few."

Wood-Drying Experiments.

A very interesting series of experiments to determine the fluctations of moisture in various woods during seasoning has just been closed on the Chicago, Burlington and Quincy Railway, at the Aurora shops. The experiments, says the *Railway Review* in a recent article, are being continued, but the first series ended in February, having been commenced December 21, 1885. The prime object of this work was to discover the laws of seasoning, if such laws existed, and thus to ascertain in what months the greatest amount of seasoning takes place, and whether wood thus seasoned reabsorbed moisture during the wet months of the fall and winter.

The work was undertaken in a very systematic way, and was done about in this wise: Three pieces of rough dressed oak, ash and Norway pine, thoroughly green, were piled loosely, with cleats between, with a board overtopping all, in a situation where they were protected against drip and direct rain, but where they were open to rain, snow, and the sun on their sides. The conditions were, as nearly as possible, those to which lumber piled for outdoor seasoning is usually subject. The dimensions of these pieces at the start were as follows:

Pine, cross dimensions, 9½ x 5¼ inches. Length, 14 feet 2 inches.
Oak, cross dimensions, 8¾ x 5¼ inches. Length, 9 feet 6 inches.
Ash. cross dimensions, 8¾ x 4⅛ inches. Length, 7 feet 5 inches.

On each alternate week pieces of wood were sawed from these timbers. From the piece of pine 5¼ inches were sawed off the same end every time, and borings taken from the center of the sawed-off block. From the ash 4 inches were sawed off for each of the first 11 tests, and 3 inches for each of the remaining 13 tests. From the oak 5 inches were sawed off for the first 11

tests, and 3 inches for the remaining 14 tests. The borings taken from these pieces were carefully weighed, then thoroughly dried out and again weighed, which process gave the percentage of moisture in each piece. The borings were always taken from the center of the block. By arranging the results of each fortnightly test the following tabulation is made, showing the fluctuations of moisture during the whole period of one year, two months and one week. The exact percentages of moisture thus obtained are given in the following table:

Date	Percentage of moisture.		
	Oak.	Ash	Pine.
December 21, 1885	40.93	27.56	24.25
January 4, 1886	40.76	27.36	23 35
January 18, 1886	41.01	28.27	23.53
February 1, 1886	42.36	28.31	23.84
February 15, 1886	42.63	28.98	23.88
March 1, 1886	42.14	28.87	23.25
March 15, 1886	42.53	28.25	23.12
March 29, 1886	42.03	27.25	22.62
April 12, 1886	42.25	26.66	22.44
April 26, 1886	41.23	24.68	21.63
May 10, 1886	39.45	22.98	20.88
May 24, 1886	37.29	22 79	19.40
June 7, 1886	37.05	20.78	17.81
June 21, 1886	36.79	20.58	18.14
July 6, 1886	35.70	17.78	16.14
July 19, 1886	36.77	15.84	15.74
August 2, 1886	34.99	12.74	12.65
August 16, 1886	35.91	13.84	14.02
August 30, 1886	35.03	14.06	14.04
September 13, 1886	34.65	13.26	13.33
September 27, 1886	36.66	13.00	15.36
October 11, 1886	33.54	12.02	13.48
October 25, 1886	33.50	13.77	14.28
November 8, 1886	33.33	14.02	14.41
November 22, 1886	Stolen.	13.78	14.68
December 6, 1886			14.55
December 20, 1886			14.92
January 4, 1887			14.49
January 17, 1887			14.10
January 31, 1887			14 61
February 14, 1887			14.35
February 28, 1887			14.61

The above figures indicate that there was a slight increase in all three kinds of wood between January 4 and February 15. The seasoning—that is, the loss of moisture, began practically February 15, with all three woods, and ended August 2 with the ash and pine, but with the oak October 11 seems to have been the finish. The results with the oak were not altogether satisfactory to the experimenters. The present second series of experiments will, it is hoped, throw more light upon this kind of wood. From February 15 o August 2 the ash dropped from 29 to 12½ per cent., a loss of 16½ per cent. From August 2 to its finish, December 20, the fluctuations were between 12 and 14 per cent., the exact average being 13.27 per cent.

From February 15 to August 2 the pine dropped from 24 to 12½ per cent., a loss of 11½ per cent. From August 2 to its finish, February 28, its fluctuations were between 12½ and 15½ per cent. From October 25, 1886, to February 28, the exact extremes were 14.10 and 14.92 per cent., a difference of only 0.82 per cent. The extreme fortnightly fluctuation was 0.51 per cent. The average fluctuation was 0.30 per cent. The average moisture for that period was exactly 14.50 per cent. These experiments cannot be taken at present as supplying infallible data, but in a general way it may be said that they lead to the conclusion that as regards oak, ash and pine woods in a green condition, seasoning begins in very early spring (depending, of course, largely upon the kind of weather), and ends in midsummer. The provisional limits of this drying season may be fixed at the 1st of March to the 1st of August—in other words, including the months of March, April, May, June and July. It has also been shown that as regards ash and pine, after seasoning is effected, the wood will not take back water—that is, not beyond slight amounts during the wet and cold seasons. These conclusions are true only for the inmost parts of the woods in question and of the sizes experimented upon. Variation in the character of the wood, condition at the time of cutting down the tree, treatment between that time and the first time of testing, sizes of pieces, &c., may alter the conclusions, although probably they would not materially do so. The data which has been gathered in this way can be used to material advantage in many ways, notably, however, as an aid in the purchase of cars and in the purchase of timber. With the exact knowledge that it affords of the seaasoning properties of different woods, and of the months during which the seasoning liable to be hastened or hindered the guesswork of sellers of lumber and makers of cars can be readily checked.

Curl in Timber.

Questions relating to the cause of curl in timber, more particularly pine, were referred some time since to Mr. H. W. Ravenel, State botanist of South Carolina, by the architect, Mr. Frank Niernsee. To the questions proposed, Mr. Ravenel answered as follows:

"I will state in general terms that the 'curl' in all woods—the pine, maple, mahogany, &c.—is caused by the interlacing or knotting of the fibers of the annual woody growth. As a general rule, these annual growths of woody fiber take a straight upward direction, which causes the longitudinal fibers to run upward parallel with each other. This is plainly seen in the splitting of ordinary pine boards in straight lines. Now, what causes these fibers of annual growth to deviate in certain trees from the normal plan is not known, and probably never will be discovered. It is a mystery connected with cell growth, which cannot be explained any more than can colors of flowers or the flavor of fruits, or why one pine in a grove may have always longer leaves and larger cores than the others. But, when once a particular tree takes up this manner of growth, it continues it in that way during its life, forming in its woody structure what is known as 'curled pine.' That which is used mostly for interior finish belongs to the long-leaf pine (*pinus australis*), the same species from which all our best lumber is obtained, both for home use and for export, and differs in no respect, botanically, from other trees of the same species, except in the peculiar curling of the annual growth of woody fiber. I have never seen any other 'curled pine' than that from our common long leaf pine, but it is very probable that it may be found also in other species, as the loblolly or old field pine. As I stated, the cause of the curling is not known. It is not due to soil, whether damp or dry, nor to winds. It may be called a deformity, inasmuch as it deviates from the normal mode of growth; but the individual trees in which it occurs are as healthy as any other, as they attain to fully the usual size. These trees may be known in the woods by the gnarled and curly appearance of the trunks. The rail-splitter will always avoid them, as they are unwedgeable. I have been assured by those who are familiar with this 'curled' lumber that the curling is throughout the boards, and that there is no distinction between heart and sap wood. It is probable from analogy with other kinds of plants, that if the seeds of these curled pines were planted, they would, many of them, produce trees having the same tendency toward curling, but as that is an experiment which would require one or two centuries to determine the result, it will probably never be tried."

Insufficient Roofs.

It would seem to the readers of the English architectural and building papers that this country is not the only one in which poor roofs abound. Some time since a writer in the London *Building News* presented the following consideration of insufficient roofs in and about London. Some of the terms used, particularly with reference to slate, are not in common use in this country, and yet, notwithstanding their presence, the article will be understood. There are some very reasonable criticisms offered with reference to poor work, particularly with reference to chimneys and flashings against fire walls, &c. The article, which was written in the winter time, was of a character to appeal directly to the interest at that season of the year:

In builders' work of an inferior kind, of which one sees a large proportion in every suburb of London, the covering of roofs is one of the chief examples of bad workmanship. The pitch of the roof is quite a matter of convenience with speculative builders; the shorter the rafters the less expensive becomes the whole apparatus of roofing. There is less timber, less slating and less brickwork to side and party-walls. We can point to terraces of houses in which the pitch is so low that during a thaw the whole of the upper ceilings were more or less saturated with moisture, and even in rainy seasons the appearance of damp places is common. If the pitch of a roof should be made to suit variations of climate, much more should it be dictated by the nature of the covering. Large and impervious slates can be laid at a much flatter inclination than tiles or small slates, but the pitch of the ordinary suburban dwelling is designed quite irrespectively of either princeple. One of the evident objections to a low roof is the ease with which a high wind will raise the slates and drive the rain between them, if not strip them off. On the other hand, the rafters can be made shorter and of smaller scantling; the higher the roof the greater the length and size of the timbers, and the more the cost. Tredgold recommends for large slates an inclination of 22°; for ordinary slates, 26.30°, or quarrer pitch, and for small slates an angle of 30°, or one-third pitch. All roofs for dwellings should never be less than the last-mentioned inclination.

When we come to consider the coverings, we find an inferior "Countess" slate used, of porous quality; the tilting fillet, or what in slaters' work is called "bell-cast," is wanting, to give tightness to the slates at the tails; the double eaves-course resting on the tilting fillet is improperly laid, and the upper courses are put on without reference to the smooth side, which should be laid downward, so as to produce close work and prevent driving rain from forcing its way through. Then we find broken and damaged slates used, and an insufficient "lap" given, often less than 2 inches, though in flat pitches it ought never to be less than 3 inches. Other details remain to be noticed. One of these is the importance of bedding the slate in hair mortar in all exposed situations. Various kinds of slate hips and ridges are made, but these are often badly fixed without reference to the pitch, and are imperfectly set in oil cement. For ridges and hips nothing is equal to lead dressed round a roll, the edges being turned under the slating, allowing the remaining width to be doubled over the slates so as to avoid nails. In the leadwork generally we find ill-formed drips or gutters, and the chimney shafts badly protected, the drips imperfectly made, and a good deal of water is allowed to enter by capillary attraction under the lead flashings. Chimneys absorb an immense deal of the rain, and ought to have a damp course inserted above the flashings or stepped to the courses above it. No part of modern houses is more scamped than the junction of the roof with the chimney stack. Slate in cement often does the duty of the step flashing, and various clumsy fillets of cement are introduced at the angles which crack and allow the water to soak into the roof and the brickwork. Quite as defective is the protection of the parapets or blocking courses, which absorb the water and convey it into the rooms below. Instead of being covered by a flashing, or coped with an impervious material, or otherwise protected by a layer of asphalt, we often see it left as built, or coated with a layer of cement which cracks and peels off after the first frost. Hundreds of parapets in this state may be seen in London, the cement work blown or cracked off, presenting a very dilapidated appearance, and exposing the wall to the full sweep of the storm. Various other points may be noticed in the coverings of modern dwellings. In tiling the object is to make the tails of each course fit closely on the backs of the tiles below, and to break joint in straight lines, by close fitting hips. But these rules are grossly violated in the commoner kinds of dwellings. The lap is insufficient, and the tiles are not bedded in mortar, two very important considerations, if weather-proof coverings are necessary. During wintry seasons like the present, the

question of making our roofs equal to the emergencies of snow storms and driving rains is as urgent as any calling for the special care and forethought of the architect and builder.

Lumber Measure.

The *Southern Lumberman* some time since referred to the discrepancies that exist between the various rules in use for determining the amount of lumber, board measure, in a log. These discrepancies are not only confusing, but work great injustice to both buyer and seller. Referring to Southern rules in force in such cases, our contemporary says:

All rafted logs here are measured in the water by what is known as the "Cumberland River Rule." This rule has been in vogue since the first raft came down the river, and has never been printed to our knowledge Briefly stated, it is this: "From the diameter of the log subtract on-third to square it. From one side of the square thus formed deduct one-fifth for saw-cut, and multiply the result by the other side (in inches), and the product by the length, and divide by 12." All logs received by rail or wagon are measured by "Scribner's rule." Now, the question is, what is Scribner's rule? In all the late editions of Scribner's "Log Book" the "Doyle" rule is used. The latest edition of Scribner's book that we have, which contains "Scribner's log measure," was published in 1870. The book we send out has the Doyle rule. To show the discrepancy in these various rules, we give the particulars of the sawing of a perfect poplar log by a band saw-mill in this city. The log measured 43 inches in diameter, and 16 feet long, and scaled, by Doyle's rule, 1600 feet; by Scribner's rule, 1480 feet; by the Cumberland River rule, less than 900 feet. All these rules are based on the supposition that the log is to be cut with a circular saw taking a ¼-inch kerf. This log was cut with a band saw cutting less than ⅛-inch kerf, and this is the result in 1¼ inch boards:

	Feet.
No. 1 (30 boards)	1,263
Common	24
Clear sap	161
Mill culls	96
Total	1,544

It will be seen that this was as perfect a log as can be found, and falls behind the Doyle estimate even when cut by a thin saw. In small logs, both the Doyle and the Scribner rules will allow a handsome gain, allowing for a quarter-inch kerf, and in cutting small-sized, high-priced logs, like walnut and cherry, the band saw mill man gets in some highly profitable work. But this is a poplar market, and we insist that no mill man can get out of an average lot of large logs, say from 30 to 60 inches in diameter, the amount of lumber given in Doyle's rule. The general adoption of the Doyle rule has given the buyer of small walnut and cherry logs a great advantage, and works injustice to the mill man who buys large poplar logs. As to the Cumberland River rule, that was adopted to offset some of the "peculiarities" of the Caney Fork raftsmen, and when a mill man gets away with those fellows in measurement, he takes the chromo by unanimous consent.

Imitation of Cedar Wood.—To give soft, white wood, used for turned articles and lead-pencils the appearance of cedar wood, the following stain is used: 200 parts by weight of catechu, 100 of caustic soda, and 10,000 of water. The finished article is boiled in the stain for a few hours, rinsed, and dried. If not sufficiently deep in color, boil for some time longer. This stain penetrates the wood so deeply that veneers of considerable thickness will be penetrated through and through, so that articles made from it can be afterward worked further without the original color of the wood making its appearance.

One of our exchanges gives two recipes for cherry stain for wood, as follows: 1. Mix together, by stirring, 1 quart spirits of turpentine, 1 pint of varnish, 1 pound of dry burnt sienna, apply with a brush, and after it has been on about five minutes wipe it off with rags. This stain takes about 12 hours to dry. 2. Take 1 quart of alcohol and 2 ounces of dragon's blood; pulverize the latter along with ¼ ounce of alkanet root; mix and allow to stand in a warm place for several days, shaking frequently. Apply with a brush or sponge. Two or three coats may be required. This is said to make a fine stain.

The Use of Glue.

The *Mechanical World* in designating the use of glue presents the following remarks:

"All the glue as received from the factory requires the addition of water before it will melt properly, and every addition of water, while the glue is fresh made, will up to a certain point increase the adhesiveness and elasticity; and it is the duty of every man who uses glue to find out just where that point lies, as it is possible to melt glue and have it so thick that after it is dry or set it will be so brittle as not to adhere to the wood. Some glues will bear more water than others, but all will bear more water than usually falls to their share, and that, too, with a greater increase in the quality of the work. For glue to be properly effective it requires to penetrate the pores of the wood, and the more a body of glue penetrates the wood the more substantial the joint will remain. Glues that take the longest to dry are to be preferred to those that dry quick, the slow-drying glues being always the strongest, other things being equal. For general use no method gives so good results as the following: Break the glue up small, put into an iron kettle, cover the glue with water, and allow it to soak 12 hours; after soaking, boil until done. Then pour it into an air-tight box; leaving the cover off until cold, then cover up tight. As glue is required, cut out a portion and melt in the usual way. Expose no more of the made glue to the atmosphere for any length of time than is necessary, as the atmosphere is very destructive to made glue. Never heat made glue in a pot that is subjected to the direct heat of the fire or a lamp. All such methods of heating glue cannot be condemned in terms too severe. Do not use thick glue for joints or veneering. In all cases work it well into the wood in a similar manner to what painters do with paint. Glue both surfaces of your work, excepting in the case of veneering. Never glue upon hot wood or use hot cauls to veneer with, as the hot wood will absorb all the water in the glue too suddenly, and leave only a very little residue, with no adhesive power in it.

Ebonizing Wood.

The Painter's *Magazine*, speaking of modes of ebonizing woods, says that the following are among the best:

1. Wash the wood repeatedly with sulphate of iron, made by dissolving 2 ounces of sulphate in a pint of hot water. When dry apply a hot decoction of logwood and nutgalls two or three times. When dry clean with a wet sponge and then polish.

2. Brush the wood with a strong decoction of chips several times. When dry give it a coat of vinegar in which rusty iron has been placed, or to which has been added acetate of iron; then apply beeswax dissolved in turpentine by setting it in a warm place; apply warm with a brush and rub till it shines.

3. Wash with a concentrated aqueou-solution of extract of logwood several times, then with a solution of acetate of iron very strong. Repeat until a deep black is produced.

4. Put 2 ounces logwood chips with 1½ ounces of copperas in 1 quart of water, boil and lay on hot. When dry wet the surface again with 2 ounces steel filings dissolved in ½ pint of vinegar. When dry again sandpaper smooth, then oil and fill in with powdered drop black mixed in with the filler. Work to be ebonized should be smooth and free from holes. Give it a light coat of quick-drying varnish, then rub with finely pulverized pumice stone and linseed oil until very smooth.

5. Boil ½ pound chip logwood in 2 quarts of water, then add ½ ounce verdigris and ½ ounce of copperas; strain and put in ½ pound of rusty steel filings. With this go over the work a second time.

6. Boil 1 pound of logwood in 4 quarts of water, add two handfuls of walnut shells or peel, boil up again, take out the chips, add 1 pint of vinegar and apply boiling.

7. One gallon of vinegar, ½ pound of green copperas, ¼ pound Paris blue, 2 ounces nutgall, 2 pounds extract logwood, boil all these over a slow fire, and add ½ pint of iron rust. Apply as usual.

A good varnish for ebonized work is made by dissolving black wax in spirits of wine. Another durable polish is obtained by giving the wood one or two coats of fine copal varnish, to be rubbed down when dry with fine pumice stone. Then put on a second coat of the same and rub down with rotten stone; cleanse and put on a flowing coat of best spirit copal varnish, and when this has become dry, polish with chamois skin and the palm of the hand. The result of this process will prove satisfactory.

Age of Trees.

A correspondent of the *Midland Industrial Gazette*, writing upon the subject of rings as indexes of age of trees, says:

The annual growth or layer is, generally speaking, an index of age in a tree, but this rule has many exceptions, the reason for which I will attempt to show in as brief and clear a manner as possible. If we place a small section of wood under the microscope, we see cavities with closed walls—cells—everywhere, however they may differ in shape, manner and forms. These, of course, are the units of vegetation and vegetable growth, hence are elements of which every part of the tree consists, and it is this growth and multiplication which makes the growth of the tree, and from the time the embryo sprouts to the last day of its life this continues. The bladder like cells of which the very embryo consists, multiply in number by the repeated division of each cell into two, when in all cases, made and provided, the influences which nature provides for this process remain impotent and unimpaired. If, on the contrary, these influences are withheld, or from any cause whatever are made impotent, the cell cannot be made to divide itself; hence the formative factor of the tree is maintained and extended, as intended. A tree may keep alive and not grow; all have seen this phenomenon, and many wondered at it.

A maple tree standing near my house, planted from the seed, was thrifty and vigorous for five years, then became stunted and puny, and in three years afterward was a scrawny, ill-shaped specimen. When it was cut down to make room for the widened street, a section taken from the largest part near the root, was placed beneath the microscope, which showed that the tree had four well defined rings, indicating a healthy, vigorous growth, after which the rings were not clearly defined, but seem to have been composed of a variety or rather number of rings, and such were very plain, giving the precise age of the tree, but if counted in a large tree would easily lead astray.

Digging down to ascertain, if possible, a cause, it was found that each root, rootlet and minutest tendril had stopped short in its growth, and ended in a round, blunt end, indicating that it would have possibly lived a few years longer, these roots and tendrils absorbing barely sufficient to maintain the fabric but not extend it. This establishes the fact conclusively of a non-separation of cells and failure to mark a ring each year.

Stain for Floors.—Boil 25 parts of fustic and 12½ parts Brazil wood with 1000 parts of soap-boiler's lye, to which has been added 12½ parts of potash. When the liquid is boiled down to 700 or 800 parts, add 3⅓ parts of annotto and 75 parts of wax, and when this is melted stir the com-

pound until it is cold. It is of a brown-red color, and the above quantity suffices to keep a floor in good condition for a year by applying it once a week, and rubbing it on with a brush.

TRADE NOTES.

DEXTER BROTHERS, Nos. 55 and 57 Broad street, Boston, Mass., are calling the attention of architects of the United States to the English shingle stain which they are introducing. This stain is said to be made of the very best English ground colors, and contains neither benzine, water or creosote. It is also free from the objection of freezing. The makers disclaim unreasonable preserving qualities for the stain. They state that there are shingles that have been on buildings in New England for over 50 years, without paint or stain, that are as good and sound to-day as when put on. They claim superiority of color which will not wash off, and a brightness that is radiant long after other stains have faded or turned black. They offer a package of stained boards by mail to any address on application.

THE UNITED STATES GUTTA PERCHA PAINT COMPANY, Providence, R. I., are directing attention to the decorative and preservative paint which they are manufacturing. In a very neat circular which they have issued, printed upon Chinese paper in two colors, they state that the gutta-percha paint which they manufacture possesses many features commending it to the favor of those who require a lasting and water-proof outdoor decorative coating. The paint containing gutta-percha and other gums of equal value is combined by a peculiar process with linseed oil, and is therefore claimed to possess all the water-proof and elastic properties for which gutta-percha is famous. White lead is used as a body, and the result is a paint which is said to be unsurpassed in covering capacity.

J. REYNOLDS & SON, Thirteenth and Filbert streets, Philadelphia, are directing attention to the Keystone steel furnaces of their manufacture, which are supplied with various fixtures and attachments rendering them desirable for domestic and public use.

THE STAR ENCAUSTIC TILE COMPANY, of Pittsburgh, Pa., announce a removal. They are at present located on the second floor of the new Penn Building, No. 706 to 710 Penn avenue. This company manufactures unglazed star encaustic tile, burned by the use of natural gas. This fuel, combined with the superiority of the glaze which the company employ, it is claimed, gives their product a fineness of body and finish not found in any other unglazed tile. In connection with their regular goods, they carry in their salesroom a full line of glazed, enameled, and art tiles, &c.

MERCHANT & CO., of Philadelphia, are directing special attention to the Star ventilators which they are putting upon the market. These ventilators have recently been tested on ferryboats in New York harbor, they inform us, in competition with other ventilators, with the result that the Star has been pronounced storm-proof, and at the same time a most excellent apparatus of its kind. Merchant & Co. also inform us that the Star ventilator has proved perfectly trustworthy in heavy northwestern gales, which are prevalent in the winter months in the Hudson valley. They confidently recommend this device as one that can be relied upon in all kinds of weather and under all circumstances.

THE WESTERN SAND BLAST COMPANY, corner of Clinton and Jackson streets, Chicago, Ill., are directing attention to the colored glass of their manufacture, which they are offering at remarkably low prices.

GOODELL & WATERS, of Philadelphia, with branch offices in Chicago and San Francisco, have issued a special catalogue of planers of their manufacture. Planers, in the estimation of many mechanics and operators, are of a few kinds and a limited number of sizes. Glancing through the work before us, however, we are impressed with the idea that the term planer is very comprehensive in its present significance, and this machine, of all that are used in wood-working establishments, has been improved and modified for special purposes until it is at present a host within itself. The firm putting out this catalogue are among the oldest in the manufacture of wood-working machinery, and have for many years made a specialty of planers. Accordingly, they seem to be justified in the claim which they put forth for this list, that it is the most extensive of any in the market. The book consists of 52 pages and a cover. It is large quarto in size. The first illustration is a pedestal jointer, a tool which was illustrated in our columns some time since. Hand planers, panel planers, pony planers, single surfacers, double surfacers, planers and matchers, &c., follow in rapid succession. Later on, the double surfacers and matchers are introduced. The central portion of the book is devoted to Woodworth's planing machine, in which a number of sizes and kinds are shown. Following this, bed planers are introduced and are described in the different styles in which they are manufactured. The plates are on alternate pages and are faced by descriptive texts.

A NEW WINDOW SASH LOCK, samples of which are offered by mail, is being introduced by the Safety Lock Company, No. 102 Canal street, Cleveland, Ohio.

WE HAVE RECEIVED from S. E. Smith & Brother, 199 West Seventh street, St. Paul, Minn., a copy of their catalogue of new designs of stairbuilders' goods. The book is of recent date, and contains numerous patterns of fancy turned solid newel posts, also designs of stair rails, balusters, &c. It is supplemented by a price list. A chapter on stairbuilding furnishes many hints that are useful to those who have work of this kind to manage.

Mr. C. POWELL KARR, an architect and engineer, with whose work our readers are already somewhat familiar, is making a specialty of building acoustics. He also gives particular attention to heating, ventilation, drainage and the sanitation of buildings generally. His office is No. 217 Stewart Building, New York.

A NEW CATALOGUE of Frink's patent reflectors for gas, kerosene, electric and day light has been issued by I. P. Frink, No. 551 Pearl street, New York. The number of different designs in which reflectors may be manufactured, and the different ways in which light may be reflected, whether from natural or artificial sources, can only be comprehended by a glance through such a work as this. Mr. Frink has made a specialty of reflectors for a number of years, and has originated a great many new ideas.

STANLEY'S CLAPBOARD MARKER, which is already in use in the hands of 2500 carpenters, is illustrated in the card of the Stanley Rule and Level Co., which appears in another part of this issue.

WILLIAM P. WALTER'S SONS, No. 1233 Market street, Philadelphia, have issued a supplement to their wood-worker's catalogue. The pamphlet contains 24 pages, is large octavo in size, and is profusely illustrated with special wood-working tools of interest to carpenters and builders in general. The goods are very attractively presented, and are accompanied by letter-press descriptions and prices.

DISSTON'S SAWS are known everywhere, but the description of one or two new specialties which this company present in another part of this issue will command attention. Our readers also will be interested in the little pamphlet which the company is offering.

WE HAVE RECEIVED from the New York Belting and Packing Company, No. 15 Park Row, New York, a handsome quarto pamphlet, entitled "Vulcanite Emery Wheels." The frontispiece in the book is a portrait of Charles Goodyear, upon whose inventions much of the work produced by this company depends. The initial chapter is entitled "Emery Wheels," and presents in brief form the processes which are used in the manufacture of different kinds of wheels, with statements of the advantages pertaining to the special wheels which this company make. Following this is a chapter relating to the exportation of vulcanite wheels, with statistical tables. A price list is presented, after which follow illustrations of wheels with details of their construction, and two engravings showing the risk of using poor wheels and the advantage of using good wheels. Engravings are also inserted illustrating Para and East India rubber trees; also some of the appliances for the manufacture of rubber goods, including rubber belting. An engraving at the close of the book presents a bird's-eye view of the works of the company.

THE INDIANA PAINT AND ROOFING CO., No. 143 Duane street, New York, are directing special attention to their sheathing papers of various colors, weights and kinds, which they are supplying the trade at low prices.

AMONG THE PROMINENT JOBS of galvanized-iron work recently executed by W. R. Kinnear & Co., of Columbus, Ohio, may be mentioned work for the new court house in that city. The interior work in this edifice is described by those who have seen it as being particularly fine in its general effect, and more particularly in its appropriateness for the position. We understand that an old galvanized-iron worker, a gentleman said to be next to the oldest cornice man in the State of Ohio, was deceived by the work to the extent of declaring it to be stucco instead of sheet metal. This remark is justly regarded by the firm who put the work in place as being a great compliment to the neatness of the work. A more recent job done by this firm is a ceiling in one of the Columbus opera houses, on which a large amount of ornamental work is required. The use of sheet metal for interior decoration is on the increase in almost every section of the country.

M. MAHONY, of Troy, N. Y., manufacturer of the Mahony boiler for steam and hot-water heating, directs attention in his advertisement to his New York salesroom, which has been opened at 100 Walker street.

A NEW FIRM styled Douglas & Cade has recently started in business as slate, tin and iron roofers, cornice makers, &c., at 270 South Clinton street, Chicago. The firm is composed of Edward C. Douglas, who was cashier for Knisely & Miller, the well-known metal roofers, for 13 years, and Samuel T. Cade, who was superintendent of outdoor workmen for the same firm for 16 years.

DAVIS & COOK, of Watertown, N. Y., are directing attention to Cook's patent level, a cut of which appears in their card on another page.

A LETTER FROM KNISELY & MILLER, Chicago, of recent date, is to the effect that the present labor troubles in that city do not in the least interfere with the filling of whatever orders they may assume. While city trade is practically suspended, the firm are still able to keep their shops running, and have more opportunity than usual to give attention to country orders. We understand that it is the policy of this firm to make low figures on country work at the present time, in order to keep up the bulk of trade. These facts should induce a large correspondence with this firm upon the part of those who have orders for small country jobs to place.

"CARPENTERS WANTED" is the suggestive headline to at least two different advertisements which appear in this issue. Carpenters are wanted everywhere—to examine new books and new tools, as well as to erect the buildings and to do the repairs which a busy community requires.

Cement for Ivory and Bone.—White wax, rosin and oil of turpentine are melted together at a moderate heat so as to form a thick fluid mass. If the cement is to be colored, finely powdered coloring substances, as red lead, ultramarine, &c., are added to the mass.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE Chicago building trades strike, which has interested the whole country, was brought to a close July 8. This was a matter of great satisfaction to the building interests of New York and other cities, since the strike at one time threatened to involve all the trade centers. The work of the arbitration committee, selected by master masons on the one hand and the striking bricklayers on the other, was well done, and resulted in a restoration of harmony. Some of the features of the agreement are of interest in this connection. A joint standing committee, to be elected annually in January, is projected. This is to be composed of five members from each organization, the president of each being one of the five, and an umpire, who is neither a working employee nor an employer of mechanics, is to be chosen by the two committees. The joint committee are given power to hear and determine all the grievances of one organization against the other, or of members of one organization against the members of the other; to settle the minimum wages per hour, the number of hours work per day, the rate to be paid for night and Sunday work, and all other questions of like nature, including the maximum number of apprentices. The officer heretofore known as "walking delegate" is to be designated hereafter as the "collecter," and all the objectionable duties and powers of the office are abolished. In this settlement the eight-hour day was conceded to the workmen as being in accordance with the State law and with the spirit of progress. The famous code of principles, to which it was proposed to make all the building trades employees give assent, cuts a figure in the settlement, and the great bone of contention—the Saturday pay day—is dropped as being of no consequence.

THE meeting of the National Educational Association in Chicago recently was the occasion of an important demonstration by the advocates of manual training as a part of the ordinary public school course of instruction. The Chicago public school authorities showed that they were fully abreast of the most advanced leaders in the new education by collecting for the inspection of visitors a large number of samples of free-hand drawing, carving, modeling, &c, done by the pupils in the Chicago schools. The specimens exhibited attracted much attention and evoked decided commendation, especially as the fact was emphasized that they had not been prepared wholly with a view to exhibition, but in the regular performance of school duties, and without interfering in the slightest degree with the usual school studies. The course of instruction in this respect was not entirely in the line of so-called art education, but embraced as far as possible, with the limited appliances available, a knowledge of the practical or utilitarian. In connection with the Chicago display, exhibits were made by other cities of the West, which, though not so striking or extensive, were of decided interest as indicating the hold which this idea of manual training has taken upon the public mind throughout a large portion of the country. Some Western colleges also showed what they were doing in actual mechanical training, exhibiting creditable specimens of work turned out by their students from the joiner's bench and the machine shop.

THE advocates of manual training also made the matter very prominent in other ways. They had organized a department of the national association for the special purpose of considering questions connected with industrial education, and by which a separate session was held. Chairman Ordway of this department delivered the principal address. He stated that of late the opinion has grown in favor that in addition to intellectual training "boys should also be taught something that will aid them in earning a livelihood. This view gave support to the growth of manual teaching. But the principle is a wrong one. Manual training should not be taught with any economical motive in control. The public moneys should not be used to make carpenters or bricklayers any more than to make lawyers or doctors. In this country the Russian system of teaching was first adopted. Its fundamental principle lies in limiting pupils' work to parts, not allowing them to complete anything. We adopted this system in Boston, in 1876, but found after two or three years' trial that it was not satisfactory. Boys wearied of forever welding, cutting and rewelding the same piece of iron or of making table legs and never a table. Boys want to see something accomplished. So we changed the system and began to have boys make complete boxes and tables. It took more work and more teachers, but the boys were at once interested. The work gratified and stimulated the pupils and made them push us instead of waiting for teachers to push them. I found that this system had already been adopted in Sweden, and very highly developed. Sweden was then and still is ahead of all other countries in the matter of manual training and is behind none in other kinds of education. In Sweden they do not confine a boy to parts, nor do they attempt to produce carpenters or blacksmiths; but they train the boys to use their hands and heads at the same time."

THE discussion which followed was of great interest, vigorous exception being taken by some of the members to the chairman's idea that economical interests should not weigh in the matter of manual training, the dissenters believing that boys should distinctly understand that they were learning something useful to them in making their way in the world. The subject of art and industrial education was further considered at a dinner given by John S. Clark, of the Prang Educational Company, of Boston, for the express purpose of bringing together prominent persons identified with the movement. This incident is mentioned to show the zeal and enthusiasm actuating the advocates of the new education, who are now inclined to look upon themselves as the disciples of a new dispensation which has sprung up and is making most rapid headway under their preaching and teaching. At this dinner Mr. Allan C. Story, president of the Chicago Board of Education, stated that he hoped to see manual training schools conducted in connection with all public schools and attendance thereat made compulsory. Some legislation might be needed to help that forward in Illinois, but the exhibition just made at Chicago would help to lay the foundation for that legislation. The professions were greatly overcrowded; the demand in mechanical pursuits had to be filled by foreigners. He prophecied an early great forward movement in mechanical educational development. The earnestness with which this question of manual training is being taken up everywhere throughout the country is most gratifying to those who recognize that our future greatness among the nations of the earth rests largely upon the mechanical ability of our people. Every step taken toward popularizing mechanical pursuits among the pupils of our schools is a stone in the pyramid of industrial independence which we are now rearing so rapidly, and which bids promise of soon becoming a completed structure.

THE attention of every visitor to Pittsburgh is called, at the present time, to the absence of smoke in that city, as compared with previous periods in its history. The change is due to the extensive use of natural gas. While every one who has been in Pittsburgh within a recent period is cognizant of the fact that natural gas is largely employed, there are few who can properly estimate the change without the aid of statistics. The number of connections with the natural gas-mains which have been made in Pittsburgh and Allegheny City since the introduction of gas is said to be in round figures 11,000. The average number of fires for each connection is placed at 6, which means that there are, at least, 66,000 stoves, grates and furnaces in Allegheny County in which natural gas has displaced coal. This estimate does not include connections with the mills and manufacturing establishments, but, further, the figuring would, perhaps, be wearisome. Leaving this to the imagination, one can conceive the volume of smoke that would rise of a winter morning from 66,000 fires within the area of Pittsburgh atmosphere, and the smoke from the 50 or more miles of mills and factories, if all were fed with coal. Since coal is no longer used, but gas has taken its place, there is no wonder that Pittsburgh has ceased to be the "smoky city." Other important deductions may be drawn from this change in the fuel of one of the most important manufacturing centers of the country. The amount of labor required in handling the coal in the houses for these

66,000 fires, and taking care of ashes resulting, is no small item. This, in houses, for the most part, is imposed on women; and therefore it is no surprise that the gas companies have had as invincible allies the women of the city. When the amount of coal that would be consumed by the manufacturing establishments is considered, all of which is now saved by gas, the difference in the pay rolls of factories can be imagined.

THE widespread expressions of approval on the question of opening museums, art galleries, &c., on Sunday has at last borne fruit in the shape of a bill providing for the opening of the Natural History Museum in New York, which has been duly approved and signed by Governor Hill. The advantages which are likely to accrue to the public in consequence of the change are great. The benefit of such collections, from an edutional point of view, seems scarcely to be properly understood, and this is not to be wondered at when it is remembered that by closing them on Sundays they are rendered virtually useless to the class for which they are chiefly intended and among whom they would do most good—viz., the artizans and workmen who are engaged in their occupations during the remainder of the week. We sincerely hope that the step now taken may result in the opening in the near future of all the public institutions of this character throughout the country.

THE difficulty which many carpenters experience of finding work at certain periods of the year has been dealt with by a young friend of ours in a rather clever manner. He has turned his practical knowledge of construction to account and has learned to draft well enough to be of sufficient use in an architect's office in making detail and working drawings to easily obtain a position at a moderate salary when times are slack with the carpenters. There is no doubt that any ordinarily bright young man could easily make himself proficient in this way, and while the knowledge might prove useful in case of an emergency, it would certainly do much in assisting him with his everyday work.

THE insurance people exercise an important influence in the matter of building construction, so far as relates to construction affecting the liability of buildings to take fire. It is only of late years, however, in this country at least, that this influence has been exercised. Now we hear of it on every hand, and certainly a good work is being done. From recent issues of Boston papers we learn that Mr. A. H. Kelsey, chief of the Inspection Bureau of the Boston Fire Underwriters' Association, has been giving particular attention to this matter, and has recently expressed his opinions upon the tendency in building matters with respect to features of this kind. He asserts that a decided improvement has been made in the direction of better construction, even in the last two years. The extent of the change is well measured in the remark that owners are at present in the habit of asking what they should do to put their buildings in safe condition with reference to fire. The lever of reduced insurance rates upon buildings which have been constructed with proper regard to fire prevention, or remodeled in an improved manner, has been a powerful one to effect this result. Architects generally have manifested the commendable spirit of interest in and sympathy with the endeavor to promote the erection of better buildings. We learn that in mercantile buildings particularly there has been a gradual working toward mill construction ideas, so that most of the new stores and warehouses in Boston are of this kind. Light floor timbers set near together and thin flooring have given way in a large degree to heavy timbers and closely laid floors which will resist fire for a comparatively long time. Lathed and plastered ceilings have also been abandoned to a considerable extent.

THE usefulness of luminous paint has not yet been proved as great as was anticipated when it was first introduced. It has been put to a number of minor uses, but none of any great importance. One of its latest applications is for painting signs in theater corridors, indicating the way out. The Government Inspector of the Royal Bavarian Court Theater highly approves of this application of luminous paint as a safeguard against panics. In case of accidents in theaters it is very common to have all the lights go out, the resulting loss of life being due to the confusion of the crowd. That a frightened herd of people trying to get out of a burning theater will peer around in the darkness for the guidance of a dimly luminous sign seems, however, hard to believe, and until the luminous paint has been put to more than an experimental test we would be inclined to doubt its efficiency. In hotels and public buildings, where the exits in times of danger are not so closely crowded, there would seem to be much better chance of luminous signs being heeded. In the case of a theater, it would seem to be better to paint the corridors and exit passages entirely with the luminous mixture, so that the walls would prove a source of light, and in some small degree supply the place of lamps. However, the only efficient preventative of loss of life by fire in theaters can only be something to bring the audience back to their senses, for there are very few fires that do not give time enough to clear a public building, provided no panic occurs.

WHILE we are being troubled with strikes of different kinds, inaugurated upon various pretexts, there is a feeling that, perhaps, other parts of the world are less concerned with labor difficulties than ourselves. For example: It seems preposterous in the Old World, where things move more slowly than with us, that a builder's strike should be inaugurated, and more especially because provisions for thorough construction are about to be enforced; and yet, it seems that a strike of this very kind is threatened in Rome. The account which we append not only indicates that the "Ancient Capital" is afflicted with the same difficulties as those known in the New World, but also that the "jerry" builder has invaded even Rome and is making himself felt. With this introduction we append an extract from a letter written in Rome, which recently appeared in one of the London journals: "The construction of houses in the new part of the city, and especially in those sections which have been demolished and rebuilt, has been carried on under regulations so bad, or so easily evaded, that the new quarter is the most disgraceful appendix to a great city to be found in all Europe. The houses are huge, tasteless stucco palaces, so high as to shut off the sunlight, necessary above all things in Rome, from the lower stories of the houses opposite. They are ill constructed, so that in more than one case they have fallen into the spaces in front of them, and flimsy and ill contrived, so that one hears the common domestic sounds from apartment to apartment, and from story to story. There is the least possible attention to the sanitary requisites which decency would permit—in short, the quarter is a huge congeries of 'jerry' dwellings, built on speculation, in which no person who regards personal comfort would continue to reside except on compulsion, and it is in general, æsthetically and economically, a disgrace to Rome. To this condemnation there are but few exceptions, so that the new Rome is compromising the character and injuring the future prosperity of the capital. The municipality, becoming finally awake to the state of affairs, has enacted new and more rigorous regulations for future construction, which will in part prevent such monstrous failures as some of those now visible. The contractors and speculators have called a general meeting to protest against this interference with the acquired rights and interests of the building trade. They threaten disorders among the workmen, and decline all responsibility for them when they arise owing to the stoppage of the works. Building has been a huge speculation here for years past. The subject is of incalculable importance to the future of Rome."

THE PLATES.

In Plate XXIX we show designs of overmantels and details of construction, forming a desirable addition to what has appeared in our issues during the past few months. Further description will be found in another column.

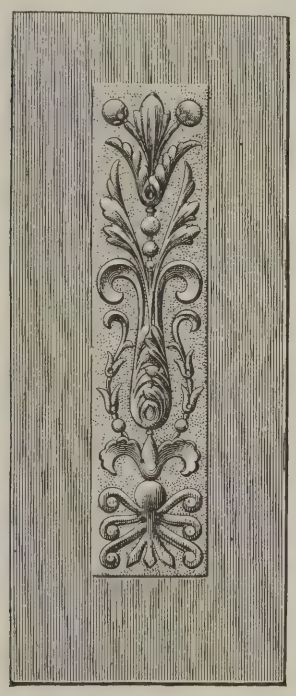
In Plate XXX there is presented a design for a library table, particularly desirable for use where portfolios of drawings and large books are to be kept. The design is of a character to be readily comprehended by the mechanic, and one that can be made, on order, even by those who are not specially engaged in the furniture trade.

Mr. Jo iah Conder, of Tokio, recently contributed a paper on Japanese architecture to the Royal Institute of British Architects. The paper was illustrated by examples of Japanese carvings, and what we present in Plate XXXI are reproductions in black and white of the colored drawings shown on the occasion named. The examples illustrate the ornamentation of partitions and screens and are treated in the same way as the ram-ma, or ventilating openings common to all Japanese buildings. They are usually carved in camphor wood, the wood being pierced, and frequently displaying a different design on each side. After being coated with a mixture of whiting and size to preserve them from the attacks of insects and decay, they are colored with as near an approach to a reproduction of the beautiful hues of nature as is compatible with their decorative nature. The same fidelity to nature is found in all Japanese work, so beautifully conventionalized in the many different materials in which their art is displayed, that, as will be seen in these illustrations, it is almost impossible to detect, excepting upon close scrutiny, where nature ends and art begins. These drawings represent carvings of (1) ducks swimming among lotus plants; (2) jays flying among chrysanthemums, water being again represented, and (3) the Iris, lilies and water. They are so delicately colored that these reproductions fail to convey more than a slight idea of the beauty of the originals. In the lower part of Plate XXXI are presented two designs for parquetry flooring, by R. Fischinger.

In Plate XXXII we present a design of a statue of John Hancock, executed in sheet metal by Bakewell & Mullins, of Salem, Ohio, for use upon the new court-house at Findlay, Ohio, to design prepared by Weary & Kramer, architects, of Akron, Ohio. The intention in this case has been to depart from the conventional figure of Justice, and yet to invest the structure, by means of its crowning statue, with some suggestion of the purpose to which it is dedicated. The figure is of heroic size, being no less than 15 feet in hight.

Wood Carvings.

The Charles W. Spurr Company, with principal office at 465-467 East 10th street, New York, and Boston offices at 35 Bedford street, Boston, are introducing a line of goods of the greatest interest to builders and designers, which they have called "Wood Carvings." Most of our readers are familiar with the Spurr patent veneers, which have been before the public for some years past. Those who have examined goods of this class will readily comprehend another application of the same general idea which has been made in the present line of goods by Mr. Spurr. The veneer, of whatever wood it may be, is placed in suitable dies and, under heat, is stamped or embossed, thus dergoes a treatment that reinforces it and gives it stiffness and rigidity, or pliability, according to requirements. The result is

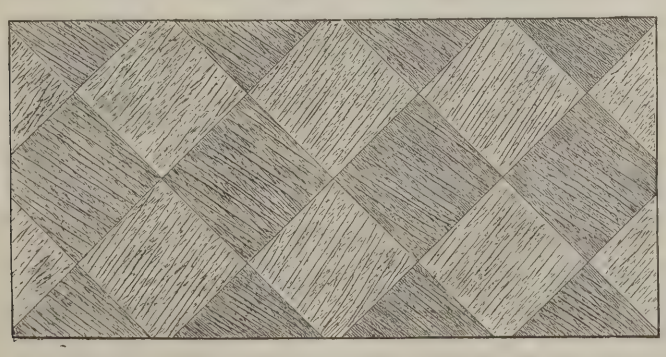


Wood Carvings.—An Oblong Panel.

the equivalent of a carving done by hand. imparting the shape to it contained in the die. While in this condition the work un- The natural grain of the wood is present, and the work is in shape to apply to furniture and cabinet work in general, as well as to house finishing. Many very handsome rooms have been finished by using panels made of this material, and panels have also been extensively used in car work. Three designs are presented on this page, which are sufficient to show the nature of the work and the wide range of application.

Among the advantages claimed for this work may be mentioned flexibility. The panels can be adapted to any surface, and may be put in position by gluing or nailing. Another advantage claimed is durability. The peculiar construction employed in the Spurr veneers are also used in this work, with the result that the carvings do not warp, swell, shrink or split. Economy is likewise a special consideration to which the company direct attention. The panels can be used in old houses, on old plastered walls, for example, without removing the work already in place. They can be applied to old pine and other painted woodwork, which makes it possible to thoroughly modernize an old interior, and that too at far less cost than new cabinet work. We also show on this page two illustrations of a new application of Spurr's veneers, in which our readers will also doubtless be interested. One represents oak and the other walnut. Strips of veneers are braided together, basket-work fashion, and are then subjected to great pressure, so as to practically embed the superimposed sections. The backing holds the work securely in place and adapts the design for use for any purpose for which it may be appropriate.

The wood carvings here shown are the result of long experiment upon the part of Mr. Charles W. Spurr, the inventor. The success attending his efforts can scarcely be appreciated by a mere description in words and the presentation of engravings. A number of samples before us are as yielding and flexible as leather, and yet the grain of the wood is preserved in its light and shade. Others are as rigid as though made of solid wood. The introduction of these goods seems to be timely, since at present public taste demands a richer and more artistic decoration than the stains, bronzes, gilts, and paints which have long been in use. The effect of rich wood carvings are admired and desired by the intelligent masses, and by this invention is rendered available. The work here demonstrated is capable of execution in wood of any kind, so that all the contrasts of foreign and domestic fancy woods may be obtained. The panels of braided work above referred to are adapted for use on floors, ceilings, and walls, as well as upon furniture and cabinet work. The organization of the company above noted includes Charles W. Spurr as president, William E. Uptegrove, vice-president, and Jerome P. Uptegrove, secretary and treasurer. The latter two gentlemen are also well known to our readers as members of the firm, William E. Uptegrove & Bro.



Basket Work Panel in Oak.

Basket Work Panel in Walnut.

Grape Design.

Eastern Workmen.

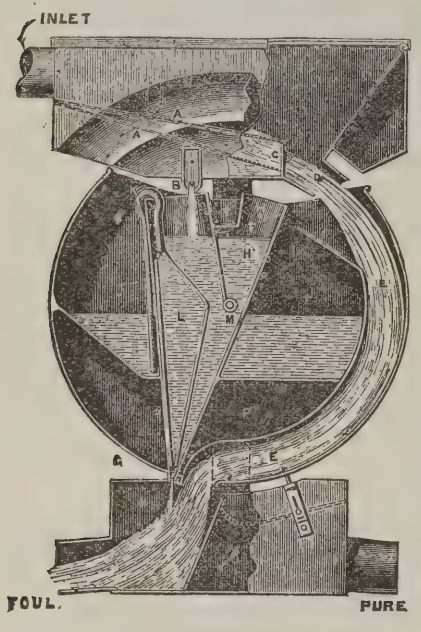
Speaking of Chinese sawyers and the apparently inadequate character of their tools, a correspondent of the *English Mechanic* says:

At Deli, Sumatra, where Chinese labor and a lucky accident of soil has created for the Dutch those tobacco plantations whose astounding profits are the envy of the Far East, sawmills do not exist, and planks must be had. To import them from the Straits Settlements, and cart them at a fearful expense through miles of mud, is not to be thought of, so a gang of Malays or Bataks are hired and proceed to fell the required timber by weeks of laborious hacking. When they have finished, arrives the Chinese "tukang pappan," or plank cutter, with seven or eight brawny Chinamen in cotton jackets and trousers and gigantic rattan hats. They proceed to where the "merban" or

Bluebell Panel.

"mivanti" lies like a fallen lighthouse, and cross cut the log into lengths of 12 feet or so, using a European saw, which, when, as is often the case, the trunk is 6 feet thick where they commence, 30 feet from the butt, has to be lengthened by strips of iron neatly riveted on, and worked by four men aside. This done, the Chinese tools come into play. First, the workman mounts the section of log with the axe, and swinging it right and left, pendulum fashion, the long handle projecting over his shoulder, chops out a deep notch at intervals of 2 feet; then beginning again, splits off the wood between the notches until he completes one side of the square. The log is then rolled over, and the other sides squared with surprising exactness in the same way. Then a young tree is cut for a lever, and all hands, with as many additional coolies as required,

raise the end of the log, packing up as it rises until it is elevated at an angle of 45° on a pile of split stuff. Lines are marked out with a wet string and charcoal for as many planks as the log will give, and then the sawyer mounts the inclined surface and, single-handed, saws from daylight to dark, under rain or sun, with scarcely a pause. The saw varies in length, but is about 3 inches width, with very little "set." The blade is shifted along the handles as the work proceeds until the center is reached, when it is reversed and moved back as it again approaches the side. When all the lines have been cut as far as possible, the other end of the log is elevated and sawn in



Rainwater Separator.—Fig. 1.—Vertical Section Through Horizontal Separator.

the same way till the cuts meet, which they generally do to a hair's breadth. The instrument, however, makes wild work in English hands.

Rain-water Separator.

Some time since we directed the attention of our readers to a peculiar rain-water separator invented and patented by C. G. Roberts, Haslemere, England. Up to that time the subject of rain-water separators had not attracted very much notice in this country. Since then considerable attention has been given to the subject by different inventors. In the interval, as is evidenced by the record of our architectural exchanges from the other side of the water, Mr Roberts has not been idle, but has continued to modify and improve the device which first attracted attention in this direction. A recent issue of the *London Builder* contains new engravings of the separator as at present used in Great Britain. The improvements relate to attachments by which a certain amount of water shall have fallen upon the roof and run off before the rain is drained into the cistern. In order to insure a thorough washing of the roof, it is deemed desirable by the inventor that in a smoky town no water shall be stored before 2 gallons of rain shall have fallen on each 100 square feet of the roof. In other localities a single gallon to the same surface is enough to wash it; accordingly, the device is provided with means of adjustment so as to be set in a way to adapt it to different conditions. Slides are provided marked 1, 1½ and 2, and by the insertion of one or the other of these separators it is set so as to drain in the way suggested. This feature was embodied in the device as it was originally constructed. The separator was canted as soon as that amount had fallen, whether it came in five minutes of storm or 60 minutes of steady rain. There was comparatively little difficulty in securing the automatic action with heavy rain, but it was more difficult to insure an unfailing action that would take in the requisite quantity in a light rain. Sometimes all the water that came in light showers was, by the use of this device, turned into the waste pipe. The recent changes, it is claimed, regulate the action in a more satisfactory manner. The improvement is effected by the introduction of the funnel shaped chamber H, shown in the accompanying engravings. Fig. 1 is a section of what is described as the "Horizontal Separator," and Fig. 2 a section of the "Vertical Separator." While the inlet and outlet boxes differ, it will be seen that the center part or canter, which turns upon the pivot M, is the same in construction in each case, but is different in position. Fig. 1 shows it before it is canted and while it is still running foul water to the waste. Fig. 2 shows it after it is canted and is running the clean water to the storage. In the earlier form of the separator, the water that came through the slide B fell direct into a large chamber with a hole at the bottom of it, rather smaller than the hole B. As soon as this chamber filled to a certain hight, the center canted. In the new form the water from B falls into the funnel F, and only a small proportion passes by the hole H into the chamber J. There is no aperture at the bottom of this chamber, but when the rain has ceased, it is emptied by the action of the syphon L. The longer leg of the syphon has been enlarged. By this simple contrivance it is claimed that the air in the top of the syphon is prevented from

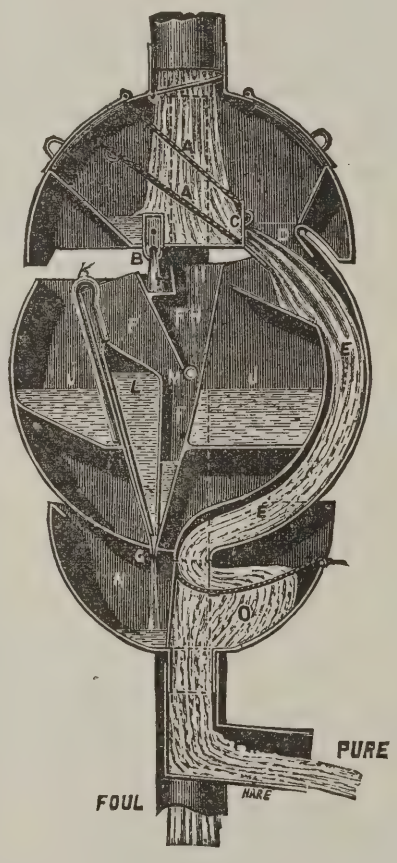


Fig. 2.—Section Through Vertical Separator.

interfering with its action, being made to take the shape of a short and broad, instead of a long and narrow bubble.

Hints on Disinfectants.

We reprint below an article on disinfectants which appeared in a recent issue of the *Engineering and Mining Journal:*

This, of all others, is the season of the year when general cleanliness, ventilation, and the judicious use of antiseptics, or disinfectants, commend themselves to all who would prevent the spread of infectious or contagious poisons, by the adoption of proper sanitary precautions.

A large number, perhaps the majority of people, continue to misapply or to imperfectly understand the word disinfectant. Thus there is a prevailing impression that the fumes of burnt vinegar or of certain aromatic rosins, or gums, woods, or essential oils are efficient agents, whereas the discoveries of modern science have shown them all to be perfectly worthless, inasmuch as they exercise no chemical action on their surroundings, and serve merely to momentarily cover noxious emanations by their own more powerful aromas.

Chemically speaking, a true disinfectant must have high oxidizing power, or at least be capable of imparting to a vitiated atmosphere the elements required to restore to it the natural equilibrium of its component parts. Thus, for example, the heated vapor of nitric acid is a very powerful oxidizer, so strong, in fact, as to rapidly oxidize charcoal, phosphorus or iodine, or destroy most organic matter by setting it on fire. Sulphuric acid, or oil of vitriol, acts as a dehydrator, and renders great service in that capacity by decomposing organic substances rich in the element of water. Many metallic salts occupy important position as antiseptics and disinfectants; and hypochlorides are similar in their action to chlorine. If bleaching powder be treated with a free acid of any kind, it throws off its chlorine gas, which then becomes at liberty to destroy germs and other attendants upon putrefaction. A solution of bleaching powder acts as a perfect decolorizer and deodorizer. The readiness with which oxygen is evolved from compounds containing the oxides of chlorine is easily shown by treating chlorate of potassium with sulphuric acid under water, and dropping into the liquid a small piece of phosphorus, which will immediately burst into a flame and burn with a brilliant light. Permanganate of potassium is another salt very rich in oxygen, and its solution in water has become widely known under the name of Condy's fluid.

Cloride of iron is an active disinfectant, and, like chlorine and its compounds, acts as an indirect odorizer while undergoing reduction to the lower chloride. Chlorides of zinc and mercury are both very corrosive poisons and powerful germicides; they have the power of coadulating albumen, and should be used in a high state of dilution, and with extreme caution.

Arsenious acid and boracic acid may both be used as preservatives, the latter being especially efficient and well worthy of more general application. Sulphate of iron is an invaluable disinfectant, its action being that of an absorbent of oxygen. Carbolic acid is also very extensively used and generally recommended and approved. A very safe and at the same time effectual compound for domestic purposes (purification of drains, &c.), may be prepared either by dissolving 2 pounds of green vitriol (sulphate of iron) or mixing about ¼ pound of carbolic acid in a gallon of water. All new disinfectants, relying upon advertisements for their sale, and of which the composition is held to be a secret, should be carefully avoided, as, the more "fearfully and wonderfully" they are made, the less likely are they to be other than costly shams.

S. J. Pardessus, Nos. 10 and 12 College place, New York, is directing attention to the Exhaust ventilating skylights and to the Dome exhaust ventilating caps, which he is manufacturing. Reference is also made, in his advertisement, to the Double Passage practical fire escape, of his invention.

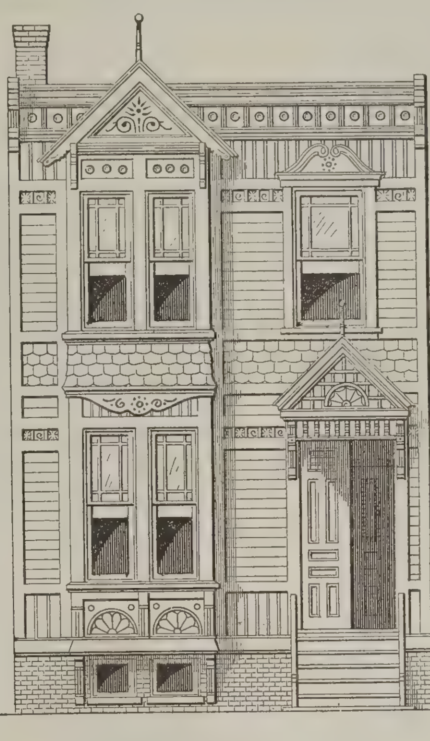
Goodell & Waters, of Philadelphia, send us a copy of their new catalogue of wood-working machinery. It is a large quarto of 120 pages, handsomely printed, and quite as elaborately illustrated as any work of the kind that we have ever inspected. Each design is accompanied by a brief letter-press description, so as to render the buyer intelligent in the selection of machinery. The book is of interest to all planing mill operators and those intending to purchase wood working machinery. A number of new machines are shown, among which may be mentioned fast-feed floorers, molders and shapers.

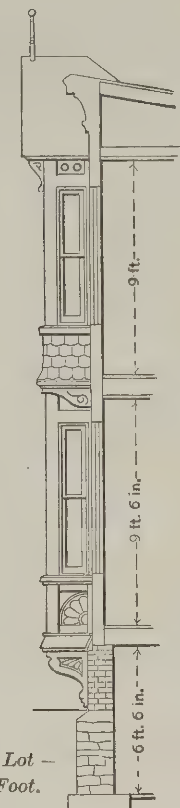
A Problem in Mensuration.

It is surprising how many carpenters and practical men fall into error in calculating the cubical contents or the number of feet board measure in a pyramid. A simple problem of this nature was submitted for solution to two of our contemporaries, and the answers given, although the same as those which we have found many men to give, were incorrect. The question was: How many cubic feet are there in a piece of timber 1 foot square one end, 100 feet long, and coming to a point at the other end—being, in fact, a simple pyramid? The answer given in both the cases referred to was 25 feet. It should have been 33⅓ feet. To find the cubical contents of a pyramid is simple, and, as given in a hundred and one treatises and textbooks, is simply to multiply the area of the base by one-third of the perpendicular hight. In this case we have an area of 1 square foot, which, multiplied by one third of 100, gives the 33⅓ feet. It is probable that the error occurred through averaging the piece—a custom not at all uncommon, although altogether wrong. Thus, the average width of the piece—1 foot at the bottom and nothing at the other end—might be taken to be 6 inches, and the average thickness the same, so that we have 100 feet × 6 inches × 6 inches, whence the answer 25 feet. The correct answer in cases of this kind can scarcely be mistaken. To take one more instance: Required, the cubical contents of a square pyramid 5 feet side of base and 9 feet high. Answer: 5 × 5 = 25 × 3 = 75 cubic feet. When the base of the pyramid is other than square, it will only be necessary to find the area and to multiply by one-third of the hight in the same way. A foot board measure means 1 foot in area and 1 inch in thickness, so that, having obtained the cubical contents, it will only be necessary, in order to find the number of feet board measure, to multiply by 12. Thus, in the last example there will be 310 feet board measure.

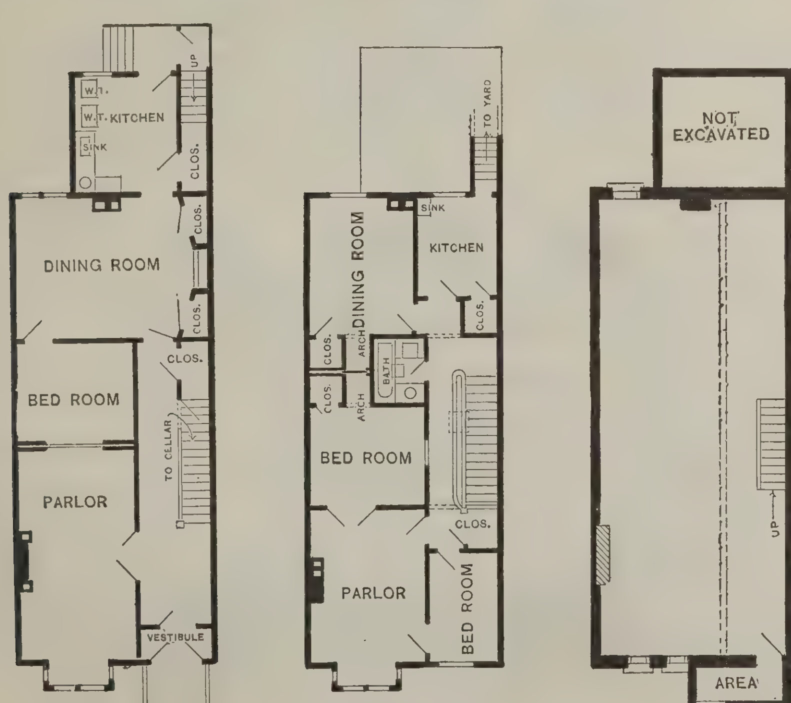
Frame House for a City Lot.

The accompanying elevation, partial section and floor plans, show a frame house, adapted for the ordinary city lot, designed by C. E. Hebberd, Architect, 62 Broad street, New York. The arrangement of the house is such as to accommodate two families to better advantage than is ordinarily secured in houses put upon such lots. Referring to the first floor, it will be seen that there is a parlor, bedroom, and dining-room, and kitchen, all provided with ample closet-room. Communication through the rooms may be had independent of the public hall. The same is true of the upper floor; there being a parlor, bedroom, dining-room and kitchen, and also a small hall bedroom. Communication with the yard from the lower floor would be through the kitchen, and from the upper floor also from the kitchen, through the back stairway. Two families living in this way would have to use the hall in common; also the bath and closet, which are located on the second floor. In turn, wash trays are provided only in the lower kitchen. There is a considerable demand for houses of this character in and about the suburbs of New York, and a number of them have been erected in the outskirts of Brooklyn quite recently. In its architectural features there is a pleasing variety about the design here shown, as compared with many buildings of this order which have been put up in the past.





Front Elevation and Section of Frame House for City Lot—Charles E. Hebbard, Architect.—Scale, ⅛ Inch to the Foot.



First Floor. Second Floor. Foundation.

Floor Plans.—Scale 1-16 Inch to the Foot.

Designs for Overmantels.

Continuing the series of overmantel designs which have characterized our columns for some months past, we present at this time sketches which show more elaborate work than anything that has yet been produced. At the present time, the fashion in furnishing tends in the direction of the use of such articles as these. They are made in walnut and mahogany very generally, al though rosewood is in demand and cherry is occasionally employed. Referring to Fig. 1 of the illustrations in Plate XXIX, it will be noticed that in its proportions it is more massive than anything that has preceded it. Accordingly, we suggest to the mechanic that the backing should be made heavier—in other words, that it should be made of 1¼-inch stuff. The extreme hight is intended to be 4 feet 6 inches, and the width also 4 feet 6 inches. The outside backings should be 2¼ inches wide, the pilasters 1¼ inches, the flat ¾ inch and the molding ¼ inch, arranged to lip on. The inside vertical backing should be 5¾ inches wide, which allows ¼ inch for the side plate molding to lip, or ¾ inch for the flat, 1¼ inches for the pilasters, 3 inches for the inlaid middle flat and ½ inch for the center plate molding. The bottom backing should be 2¼ inches wide, carried across the whole width of the frame. An additional piece of stuff 2½ inches wide should be butted into the middle division to form a wide backing. The size is to be as follows: 1¼ inches for the bottom molding, 3 inches for the flat and 1½ inches for the molding, which would form a rabbet for the center plate. The inside horizontal backings should be 3¼ inches wide. Add an extra backing 2½ inches wide to the center plate, allowing 3 inches for the inlaid flat. The top horizontal backing should be 3¼ inches in width. The two short side cross rails should be 3¼ inches wide. Put the backings together and clean off ready for veneering. Then lay all plain veneers;

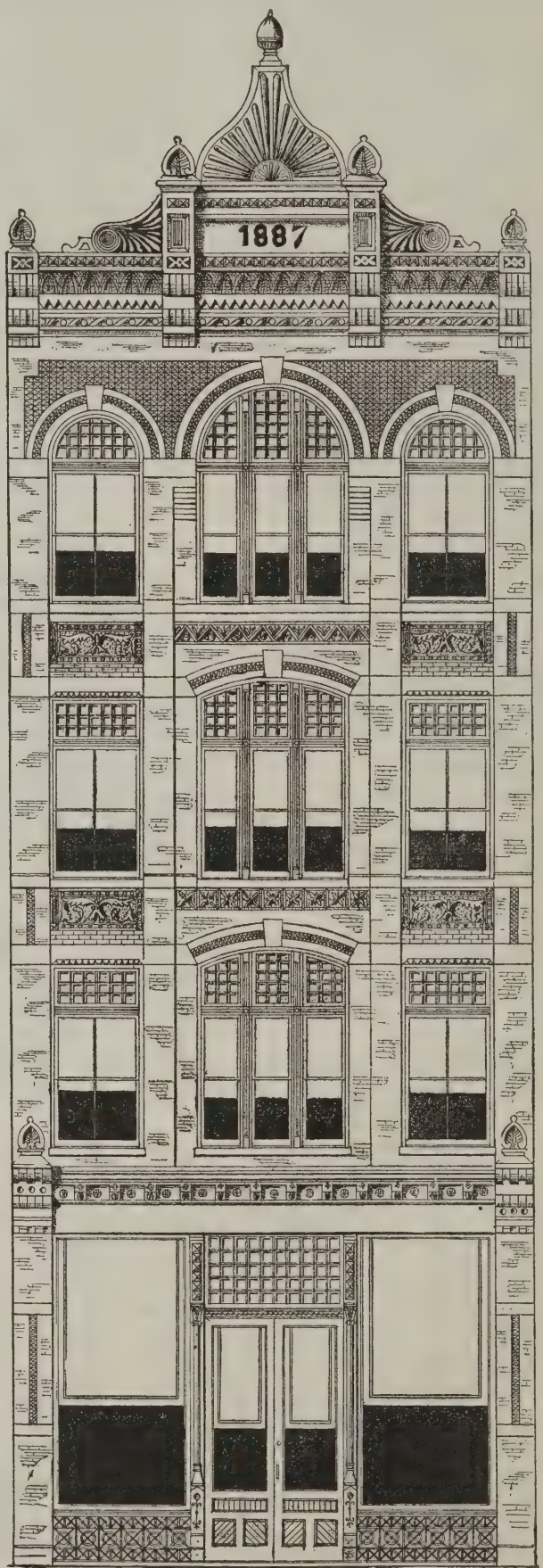
they should join underneath the pilasters, so that the joint will not be seen. Next, the moldings should be struck for the openings and fixed, with the exception of those for the center plate, which should be put in position after the marquetry is laid. Then get out veneers and mark sight lines for marquetry cutter. While the marquetry is being cut it will be well to get out the pilaster veneer. Presuming that the inlaid work is by this time quite ready, commence the inlaying. The 3-inch flat around the middle plate might be done first. Then lay panels on ½ inch mahogany and the brackets on ¾-inch mahogany, or any other hard wood that may be used for the purpose. Next clean off all the veneers and then lay and clean the pilasters. Then the sides should be veneered. Next strike and fix the corners and base moldings, mitering the latter around the pilasters. The job is now ready to be polished, after which it will have to be fitted up.

Fig. 2 is drawn to the same dimensions as referred to in connection with the preceding illustration. By reference to the design, it will be seen that 11 small mirrors in addition to the center plate are introduced. Small pieces of glass in work of this kind are at present very fashionable; and therefore it may be predicted that this design will be popular on this account. The center plate in this case would measure about 2 feet 1 inch by 1 foot 8 inches. The sizes of the smaller plates would work out about as follows: The small square mirrors immediately above the center plate about 4 x 4 inches; the oblong one would measure about 4 x 10 inches. The two semi-circular plates above the top shelf would measure 11 x 5 inches, and those between the two shelves in the side division about 5 inches square. The one shown underneath the bottom shelf would measure about 5 x 7 inches. Variations in the plates will instantly suggest themselves to the reader. A larger middle plate could be substituted, doing away with the three small plates which are immediately above it at present. In place of the half circular glass panels at the top, a piece of inlaid work might be inserted. Oval panels might be substituted for the half-circular as at present. The pediment in this case differs materially from that shown in Fig. 1. A shelf has been extended across the center of the design above the plate, taking the place of the top side shelves in the first instance. In constructing the work in this case, the difference is not so great from that already described as to warrant special particulars.

Fig. 3 shows an overmantel in what may be called the Chippendale style. It is simple in outline and the enrichments are inexpensive. The backing should be cut to the same dimensions as those already described and put together. The block to form the shape for the center plate might then be fixed. Care must be taken to give the shaped top piece a nice sweep. Clean off and veneer the front and clean up the veneer. Cut out and fix the pilasters which are plain and not beaded and veneer the sides. When quite dry clean up the side veneers and fronts of pilasters. Then get out the molding for the panels. Next the brackets, shelves and the stuff for the turned work might be made ready. In Chippendale furniture square turning was largely employed. In some cases it was cut right through both ways, which gives a light and pretty appearance. In other cases it was ground out or paneled out. As shown in the sketch, the top of the shaft of the pilasters is thicker than the block; therefore the block must be cut out separately and the pillar doweled into it. A pin should be turned on the pillar and the blocks should be socketed. With regard to the frets, it is advisable to glue them on to a solid panel, as they are less likely to get broken and would thus harbor dust less readily. An interrupted scroll pediment which was frequently used in Chippendale work is shown in this design. The corners and frieze moldings might next be got at and mitered around. The canted cornered panel in side division should be a loose one. A separate frame, half lapped, would have to be made to proper size. In each corner a block cut to required shape should be fixed. At this stage the work is ready to pass into the polisher's hands. We show in our plate pages details of the work here described which explain themselves.

Design for Store Building.

The accompanying engraving of the front elevation of a store building represents some recent work done to the plans and specifications of Messrs. Baumann Brothers, Architects, Knoxville, Tenn. We have presented the floor plans of the different floors, thus indicating the arrangement of the elevator, shelving, counters, &c., and the central line of supporting posts. The building, we are informed, is constructed of red pressed brick, trimmed with white Tennessee marble and terra cotta. Plate and cathedral glass finish the front. The offices and stairways were done in natural wood. The side walls were plastered and the ceilings ceiled. The elevator is H. J. Ready's hydraulic, of the latest improved pattern. The cornice and pediment of the front is made of galvanized iron. The cost, including the elevator, is placed at $7500.



Store Building in Knoxville, Tenn.—Baumann Brothers, Architects.—Scale, ⅛ Inch to the Foot.

Sandstone as a Building Material.

W. K. SULLIVAN.

Sandstones consist of small grains, chiefly silica, aggregated into a compact rock, the grains being cemented together by various substances. Sometimes it is carbonate of lime, sometimes silica or iron, and sometimes clay. The nature of the cementing mass has considerable influence upon the character of the rock; iron is, however, the most usual, and the one which forms the most typical sandstone. There is a great variety of color, from white through gray, yellow, red, and brown, to black. Sandstones are of all geological ages, from the lowest sedimentary rocks to the most recent. The older rocks are usually the most compact and in general contain some felspar grains, and frequently a large quantity of clay, which gives them more or less of an argillaceous character. When sandstones are very hard, and their fracture harsh, and they contain small silicious pebbles, they are usually called grit. If the rock consists not of grains of sand, but of numbers of pebbles cemented together, it is designated a conglomerate, which is further subdivided into pudding-stones when the pebbles are rounded, and breccia when they are angular. And as these pebbles may consist of any kind of rock, there exists a considerable variety of these compound rocks, which are distinguished by the nature of the pebbles of which they consist. Sandstones are generally excellent materials for buildings, but for this purpose they should be firm and uniform in texture, and free from iron pyrites or iron sand, which would by their rusting not only spoil their appearance, but render them liable to peal off on exposure. Many sandstones, especially those from the thick beds of what is called the new red sandstone (or from the variety of colors from white to dark brown which it exhibits, the variegated sandstone), and which lies above the coal measures, are exceedingly soft when first quarried, but gradually become hard when exposed to the atmosphere. Others, again, especially those rich in clay, although compact and hard when freshly quarried, crumble away rapidly on exposure. The durability of this class of stone depends, however, very much upon the nature of the climate. Any sandstone which will bear exposure for some weeks, after being saturated with a solution of glauber salt, may be considered fit for use.

Timber Beams.

J. ROBISON.

It is evident that the nicest work is indispensably necessary in building up a beam. The parts must abut on each other completely, and the smallest play or void takes away the whole efficacy. It is usual to give the butting joints a small taper to one side of the beam, so that they may require moderate blows of a maul to force them in, and the joints may be perfectly close when the external surfaces are even on each side of the beam. But we must not exceed in the least degree, for a very taper wedge has great force, and if we have driven the pieces together by very heavy blows we leave the whole in a state of violent strain, and the abutments are perhaps ready to splinter off by a small addition of pressure. This is like too severe a proof for artillery, which, though not sufficient to burst the pieces, has weakened them to such a degree that the strain of ordinary service is sufficient to complete the fracture. The workman is tempted to exceed in this, because it smooths off and conceals all uneven seams; but he must be watched. It is not unusual to leave some abutments open enough to admit a thin wedge reaching through the beam. Nor is this a bad practice, if the wedge is of material which is not compressed by the driving of the strain of service. Iron would be preferable for this purpose, and for joggles, were it not that by its too great hardness it cripples the fibers of timber to some distance. In consequence of this it often happens that in beams which are subjected to desultory and sudden strains (as in the levers of reciprocating engines) the joggles or wedges widen the holes and work themselves loose; therefore, skillful engineers never admit them, and, indeed, as few bolts as possible for the same reason; but when resisting a steady or dead pull they are not so improper, and are frequently used. Beams are built up, not only to increase their dimensions in the direction of the strain which we have hitherto called their depth, but also to increase their breadth, or the dimensions perpendicular to the strain. We sometimes double the breadth of a girder which is thought too weak for its load, and where we must not increase the thickness of the flooring.

The Relations of Temperature to Health in Dwellings.

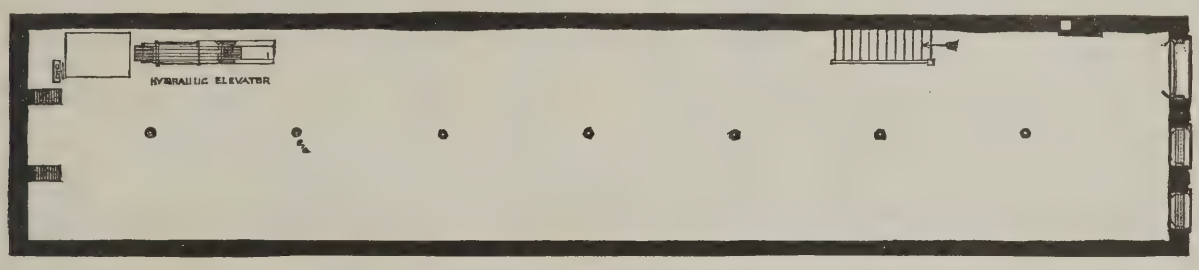
The following paper prepared by Dr. D. Benjamin, of Camden, N. J., contains much information on the subject indicated by the title that is of interest and value to a large class among our readers:

What is generally called a cold is always produced by some change of temperature, with or without moisture, to which a part or the whole of the person has been exposed. In most cases the change must be from a given temperature to a lower one in order to produce a cold. One is more apt to take cold if a part, and not the entire body, be exposed to a low temperature. Dampness adds greatly to the power of a low temperature to produce a cold.

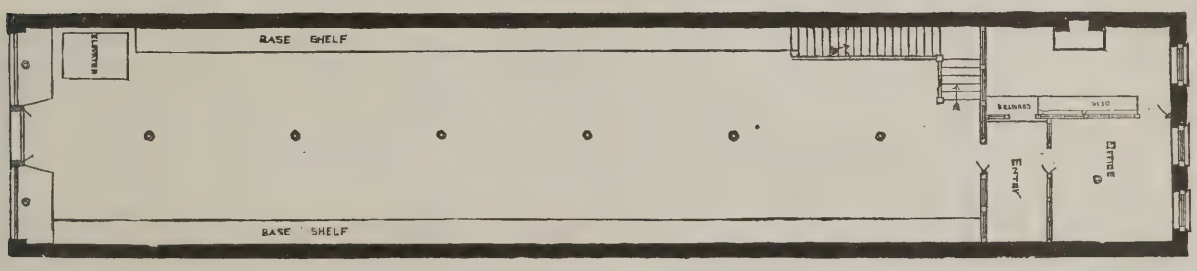
A cold is a disturbance of the circulation of the blood, whereby a part of the body has too little blood in it, and, therefore, some other part has too much.

The part that has too much is said to be congested, and if the congestion is not promptly relieved by treatment, inflammation is sure to follow. If in the throat, croup; lungs, pneumonia; bladder, cystitis, &c.

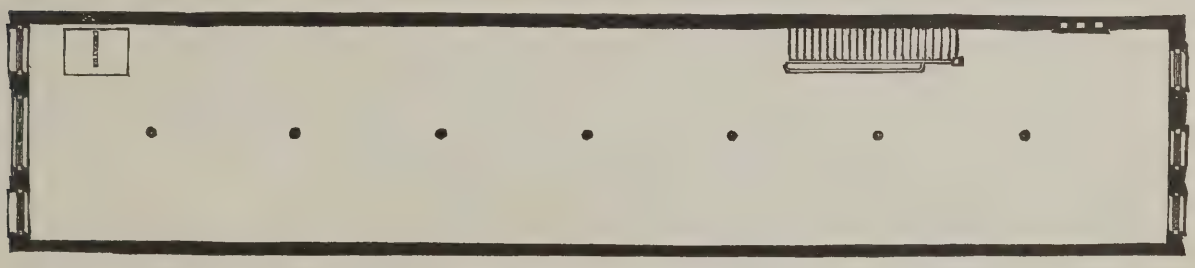
The human flesh is elastic and contractile, and, therefore, when cold is applied to a part it contracts, holding much less blood, consequently some other part must contain more than it should. Moreover, all vital



Basement.



First Floor.



Second, Third and Fourth Floors.

Floor Plans of Store Building, Knoxville, Tenn.—Scale, 1-20 Inch to the Foot.

action goes on more slowly in a low than in a high temperature, so that by cooling a part overmuch its nerve energy and vital force are greatly affected, causing delayed and dangerous reaction, or actual destruction of a part, while the undue blood in some other part of the body lights up inflammation that would not have been called into existence without this stimulus.

Cold applied to the skin generally produces congestion of the mucous membranes, because of their similarity of construction, nerve supply, and continuity of structure to the skin.

The most healthful temperature for the human body to live in is about 70°.

In a slowly moving atmosphere at 70° F. a person cannot take cold, but a change of 10°, especially if it is sudden, is often sufficient to cause one to take cold.

The foregoing are undeniable truths, based on physiology, chemistry and physics. Their importance and the practical application of them, especially in the prevention and treatment of diseases of the respiratory organs, we will now consider.

A few years ago I began making some observations and experiments on the circulation and temperature of air in rooms, with results which appear to me to be of practical importance.

The conditions of temperature and circulation of air vary greatly in rooms, especially those that are in use.

Fig. 1 gives results of experiments in a room 10 feet high, 12 feet wide, and 20 feet long, with a good stove and steady fire. Three-story brick house, south front, 12 rooms, warm cellar. Outdoor temperature, 24° F. By examination of Fig. 1 it will be seen that when the center of a room is 78° F., 4 feet from the window it may be 70° F., 1 foot from window 54° F., and at window 40° F. (no doors or windows having been opened for 30 minutes), a difference in the room of 38° F.

In Fig. 2 a vertical section of same room, it will be seen that while the head is in 75° F. the feet may be in 50° F. What must be the effect on a person who removes his warm boots and wears slippers, or the one that lies down to sleep on such a floor? Many do these very things, however. A child three or four years old, from playing near a stove or on a nurse's lap, in a temperature of 70° or 80° F., perhaps in a sweat, goes to a window and stands, with out any change of clothing or other protection, for half an hour or more, in a temperature anywhere from 30° to 55° F. How such a thing can occur without resulting in croup or pneumonia must be marvelous to any one who studies the subject even casually.

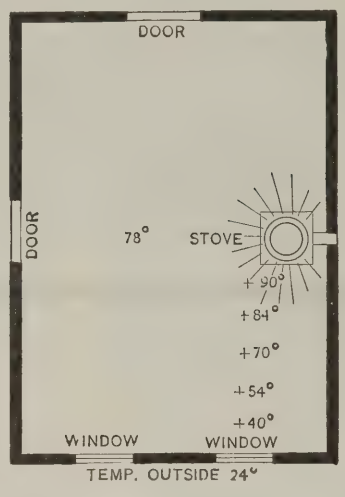
In many instances there is a small crack or opening either under the sash or at the side, and almost always at the junction of the upper and lower sash, where a stream of air is passing into the room nearly as cold as the outside air, though it be below zero. Cold air at a high speed striking a child directly on bare throat or breast can seldom fail to produce some dreadful disease.

On a very cold day, in some of the wooden houses inhabited by poor people with many children and little time to look after them, children may be often found sitting on the floor in a temperature of 38° F., or standing with nose against window pane at 20° F., when the mother is washing or ironing in 65° F. These people generally have but one fire in the house, and that in a cook stove, which cannot heat the floor at all, while cold drafts come from every other room, and especially from the stairway.

In churches and theaters the galleries will be 85° to 90° when the floor is 70° F. Then the opening of a door or window is very injurious, and going out into the air at 10° or 20° F. also causes a dangerous strain on the system.

In view of the principle already given, it seems to me that this is a striking state of affairs, and perhaps no principles of hygiene are so grossly violated as these. No wonder that the death list in Philadelphia alone in a single year reaches the dreadful sum of 1000 from pneumonia and about 400 from croup (preventable diseases in most cases). It is also somewhat remarkable that the subject has not before been written up in medical works. The thermometry of hygiene and the sick room is a fruitful field for cultivation.

By reference to cuts, it may be seen that it is easy to be exposed in five seconds to a change of 40° F., a circumstance that can never occur out of doors. In open air the temperature is nearly the same from head to foot, and changes much more slowly than in the house. A child gets off the bed and sits on the floor, a change of 10° F., it may be 20° F., or it goes to the window, possibly to scratch in the beautiful frost-work on the



Relation of Temperature to Health in Dwellings.—Fig. 1.—Plan of Room Showing Variations in Temperature.

glass, a change sometimes of 40° F. This explains why people take cold more frequently in the house than they do out of doors. In fact, I do not believe that people will take cold by habitually going out if they exercise and are properly clothed.

By reference to Fig. 3, it will be seen that when the first floor was as low as 48° and 50° F., the second floor was 65° F., and all the second floor room was of a more even temperature. This is owing, of course, to the cold under the first floor and the heat, 90° F., under the second. It shows why the sick should be, if possible, in the second story, over a room that is heated, and why relapses occur when patients are permitted to come downstairs. The contrast is greater in many instances than shown in the figure, which represents a grade of houses better than the medium.

Most of the foregoing experiments may be performed as follows: Take 1½ dozen thermometers (common japanned tin cases), set them in water very cold, 33° F., and well stirred; ascertain the difference in the register, if any, and note it by pasting a little slip of paper with the correction on it near the top. Then place the thermometers all in water at 120° F., well stirred, and correct as before; then in water at 70° F., and correct. These corrections will render them sufficiently accurate for practical purposes. Lay six of them across the floor, or, better, on blocks ½ inch high, in a row equally distant one from the other, extending from wall to wall; then stretch a string or wire across the room in the same vertical plane as the row of thermometers, and hang another row on it right above the first; stretch another row across in the same plane at ceiling. You will then have three horizontal rows and six vertical rows. Wait 30 minutes, then read off the temperatures and record them on a piece of paper to represent the vertical section of the room. Any number of such sections may be made in a room, and should be made to include windows and doors as a main feature. Temperature of windows can very easily be taken by placing or hanging thermometers on the sash.

It is clear from what has been stated that to keep well or to treat diseases, especially of the respiratory organs, such as pneumonia, croup, pleurisy, bronchitis, coryza, &c., we should keep an even temperature of about 70° F. The thermometer should be on a level with the patient's head and near by; a good way is to hang it on the bedpost at the head of the bed, and the mercury should not be allowed to fall below 68° F. or rise above 74° F. If the floor is warm the whole room can easily be kept so.

A bed should not be kept against a cold wall. If it cannot be in the middle of the room it should not be near a window or door, and should always be pulled out from the wall 6 inches or more, so that the cold air, which always descends along a wall, can have room to drop to the floor without flowing over the bed. A great many cases of rheumatism and neuralgia come from sitting near a window.

I have often tried lecturing parents and nurses about the importance of keeping children away from windows, but it is very often impossible to have the instructions obeyed. Windows are very attractive to children, especially when the weather is too severe for them to play out. Any woman's mind would be dreadfully strained who has her housekeeping to attend to if she were compelled to keep her eyes constantly on a number of children, even if she could compel them to obey when detected.

Some years ago I devised a contrivance to protect children from the death-dealing windows in cold weather which has given me, as well as parents, much satisfaction. It is simply a fender of metal (also made of wood) about 3 feet high, and extending out from the window 15 or 20 inches.

In some families where I have had these screens arranged to the windows for one or two years I have reduced the medical attendance very greatly, as my books will show.

In Canada many of the dwelling houses have double sash, glass about 4 or 5 inches apart, a very good device, and one that diminishes the coal bill also. They are a little unhandy to keep clean.

About 2000 cubic feet of fresh air is needed per hour for each individual in a room, and when no fresh-air registers are provided can only be supplied through the keyholes and cracks around the doors and windows, making necessarily strong and dangerous drafts. The only resource left the physician, therefore, is the making of strenuous efforts to have people keep away from the dangerous places.

Leaving bedroom doors ajar or windows slightly raised in cold weather is sometimes dangerous, on account of drafts, and though it may be occasionally necessary, it generally requires more knowledge of sanitary science than is possessed by the masses.

On being called to see a case, I rarely find a thermometer in the sick room; its importance is not realized by the laity (or the profession). If there is one about, it is out of doors or often good for nothing. The amount of ignorance in regard to the ther-

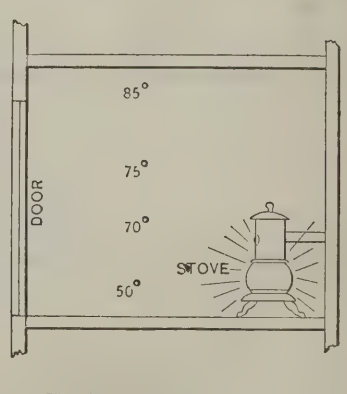


Fig. 2.—Vertical Section of Room Shown in Fig. 1.

mometer is remarkable. I often find people using one that is broken, and working against the pressure of the atmosphere instead of a vacuum. Once a lady said to me on my second visit: "Doctor, I don't see as that theometer is any good; I've been a-watchin' it, and I had to use more coal to keep the room warm than afore I got it; I gist might as well a throwed the money away." Still, I am in the habit of ordering a thermometer with the first prescription, though many would apparently

pay $5 for medicine more freely than 25 cents for a thermometer that might save 10 times that amount.

No one can tell by his own feeling whether a room is warm or cold, for often you will see two persons contending in the same room, one that it is too warm, and the other that it is too cool. It is obvious that we cannot regulate for invalids or others by our feelings. The only unerring guide is the silent, sensitive little column of mercury.

The more rooms that are kept heated in a house, the less drafts will be found. Especially heat the halls; it will not take much more coal, and will avoid forcing your heaters or stoves, and enable you to keep easy fires. Keep the cold air from under the house also.

The artificial life of civilization causes greater susceptibility to colds at the same time that it exposes us to greater changes of

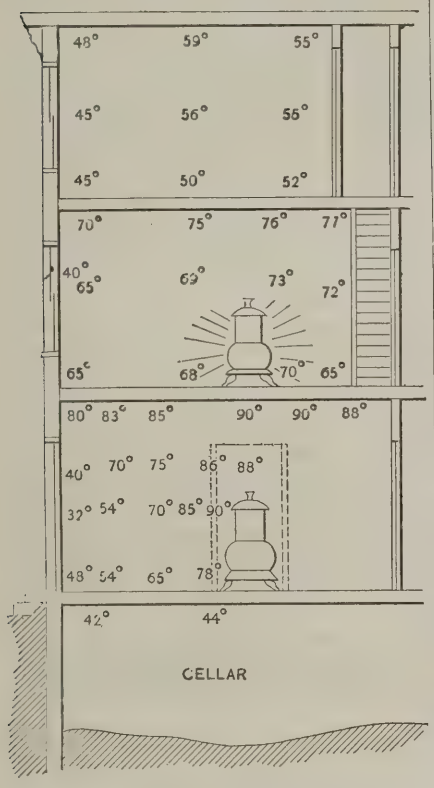


Fig. 3.—Elevation of House Showing Varying Temperatures of Different Rooms.

temperature; but science enables us, on the other hand, to oppose with some success these pernicious influences. The study of this subject shows not only the varied principles that lie at the foundation of successful practice, but also the importance of the collateral sciences to medical education. And it is believed that even the few suggestions of this paper, if properly applied, would reduce the amount of sickness and death consequent upon the habitual neglect of easy precautions.

One of our exchanges, referring to fireproof paints, makes the following remarks: "Many valuable improvements have been lately made in the manufacture of asbestos paint in England. In the tests made of its efficiency a piece of light pine wood, about 6 inches long by 4 inches square, painted with five coats, was placed for upward of half an hour in an ordinary grate fire, but, although the wood within was reduced to charcoal, there was no blaze whatever emitted during the charring. Again, a small model theater, built of wood, with set scenes and accessories, was sprinkled with turpentine and set on fire; every portion was ignited and the whole was consumed. A similar model, with the set scenes and the wood framing all painted with asbestos, was drenched with turpentine and set on fire, too, but the thin scenes were only partially charred at the the lower ends with the turpentine flames, while the timbering of the model was not even ignited."

ROOFING NOTES.

Gravel Roofing.

The above term, says a correspondent of *The Metal Worker*, is a very indefinite one, as it only indicates one of the component parts of which the roof is composed, which nature has kindly furnished, leaving one to guess what is used to make the roof strong and water-proof, so as to resist the heat of summer or the cold of winter. It is curious that no one has thought of making a gravel roof ornamental, which could be done by using gravel of different colors, and thus have the roof of the house rival the crazy quilt in the rooms of the mansion. As it is not the appearance of a roof that makes it valuable, it might be well to look at the parts that are supposed to make it strong and water-proof. While a cheaproof can be made of building paper and coal tar with a sprinkling of sand on top, it must be evident that materials of greater strength and durability are required for a serviceable roof. The tar for roofing is made by boiling coal tar until all of the light parts are removed and nothing but pitch remains. This pitch is so dense that it is broken up for melting with an axe, and is mixed with about an equal amount of coal tar when used for roofing purposes. Sometimes a limited amount of rosin is put with the composition. As this composition cannot have much strength, the value of the roof must depend on the material that goes by the name of felt that is used to spread the pitch on. This material can be procured of great strength. The writer tested a sample ½ inch wide, and it was with difficulty that it could be pulled apart. This sample was two-ply, and the same kind can be had that is three-ply. A kind of roofing that is almost as strong as leather is made by H. W. Johns, of New York. There is a foundation of coarse cloth or sacking, upon which the water-proof cement or pitch is spread. The felting is then placed on this pitch. To prevent the roofing from sticking to the roof, Manila paper is cemented to the under side of the roofing. To apply this material the roofing is laid on the roof and the joints nailed with nails having very large heads; then one or two coats of prepared cement are put on top by means of a brush and coarse sand sprinkled on; then the coating of white asbestos covering is applied, which makes a very durable roof, and, in case a roof has to be used as a sidewalk, is as good a one as can be made. It must be evident to any one that the best way to procure material for gravel roofs is of those who have had experience in the business, for their facilities for procuring materials best adapted to the purpose are much better than those who can only procure such articles as they may know of, not having had the experience of years to direct them in their selection. When a composition roof is to be placed upon another roof it is a good plan to commence at the top and work down. The sheets of felt can be slipped under, so the laps will be right, and then the new roof can have one coat of cement before leaving the roof at night, and in case of a rain no damage is done, as the water cannot run under the new roof. When a new roof is being put on that is so large that it cannot be finished in a day, this is a good plan to pursue. While tinners may not feel very favorably disposed toward any but sheet-metal roofs, there is frequently the necessity of putting on such kinds of roofing as the customer may want. In such cases the old saying, "You pay your money and take your choice," is applicable.

A Supplemental Roof.

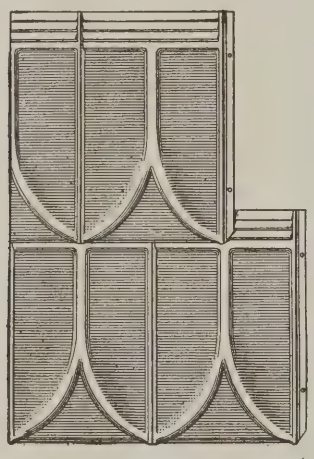
Those who are being troubled with damages to metal roofs by people walking over them will doubtless be interested in a plan that has lately been put into use by Mr. T. M. Barrett, of Pittston, Pa. The roof over Mr. Barrett's shop, consisting of corrugated iron, is so located with reference to the front part of the building as to be walked over very frequently, greatly to the damage of the roof and to the damage of goods located in the building by reason of the leaks. With this condition of affairs prevailing, Mr. Barrett conceived the idea of putting on a supplemental roof underneath the rafters sustaining the original roof. In other words, he has applied corrugated iron to the inside of the ceiling of the building in a way to shed water. In the same general manner he has arranged a gutter at the eaves of this supplemental roof in a way to carry off the water which penetrated by reason of leaks in the original roof. We understand from those who have inspected this arrangement that the inside roof is in every way a success, and that there is no further trouble on the score mentioned.

New Oblong Shingle.

The Cortright Metal Roofing Company, of Broad and Race streets, Philadelphia, have just ready for the market a new oblong shingle that possesses novel features of construction, and which, in point of design and general utility, seems calculated to attract considerable attention. It is the latest addition to their already large and varied assortment of roofing specialties. The first of the engravings (see next page) shows three and a half shingles joined in process of laying. It will be noticed, first, that the embossing of the shingle is of such a character as to cause the article to simulate slate or tile. In this respect it may be considered as architectural in appearance, and should be a candidate for favor for this reason, if for no other. As we have remarked on previous occasions, many of the metal shingles which were first put forth had designs given them which were devices without any special reference to architectural effect; or, more particularly, were of a kind to impart stiffness to the metal regardless of the effect from another point of view. In this case, as well as some others which we have noticed in the past, architectural effect has been secured, while nothing in the shape of rigidity has been lost. It will be noticed that the shingles in laying, break joints, and that this is accomplished in such a way as to detract nothing from the appearance of the roof. The upper end of lapped portion of each shingle is constructed in the form of a series of inclined planes. These form a successful barrier against the penetration of moisture, even in case of a driving rain. The sidelock and nailing flange are peculiar in construction, as will be gained from an inspection of the sectional views presented herewith. The grip which one shingle has upon another when joined by means of this sidelock, is something phenomenal, and is to be appreciated only by careful examination and experiment. At the same time, as will be noticed by one of the sectional views, the nature of the parts is such that the shingles readily combine. The special feature that is to be observed is that the overlapping portion of the upper shingles comes in contact with a flat surface on the lower shingle; accordingly, any inaccuracy in placing the individual shingles in a course does not necessarily affect the weather-proof qualities of the completed roof. The point formed by the upper shingles need not, necessarily, actually coincide with the rib in the lower shingles matching it. This feature will be appreciated by many who in the past have been perplexed to know what to do when, from careless lapping or other cause, the courses have not run even. Great care has been exercised by the company in the production of this shingle, and in its present form it has been tested in every possible way, in order to demonstrate its value as a roof covering, before offering it to the public. We are assured that it has stood all the tests successfully. Great care has also been exercised in the production of the dies on which this work is made, and the company inform us that in offering the goods to roofers, they are doing so in the belief that they are sending out the best finished shingle that has ever been made.

From a letter received from the company we gain several points that are of interest to our readers. The raised platform running across the top of the shingles below the serrations, and on which the lower edge of the shingle above pinches to make a tight joint, is the principal subject of a new patent, application for which has been made. This is

claimed to be an entirely new principle in the construction of tin shingles, and the company believe it will cause a revolution in them, because by the use of it the necessity is avoided of bending up the middle of the bottom edge of the shingle above, in order to jump over the side seam of the shingles below. This bending up has always been a very objectionable feature in shingles for several reasons; in the first place, it weakens the lower end of the shingle and renders it liable to break at that point, and, second, there must be a raised crown above the notch or break, or its equivalent, in order to restore stiffness to the sheet, which the making of the notch destroys. Still another objection to the use of the notch in the middle of the bottom is, that it requires that each shingle of each succeeding row shall be brought exactly and without any deviation whatever to the side seam of the course below, in order to get over it without leaving an opening for snow or rain to blow through. In laying shingles constructed upon the old plan, if these notches do not come to the right place, it is sometimes necessary to take off whole courses of shingles already laid, in order to begin again to lay them either tighter or looser as the case may be, in order to make the notch fit where it belongs over the seam. In view of these facts the company assert that this invention has many advantages. Inasmuch as it is not necessary to jump over the side seam, it makes no difference, except in appearance of the work after being laid, whether the middle of the lower edge of the shingle comes to the



New Oblong Shingle.—Fig. 1.—View of 3½ Shingles Combined on a Roof.

side seam, or whether some other part comes against it. They assert that the new shingles, with the side joints of one course continuing upward with the side seams of the course below, supposing one should chose to lay the work in that manner, would still have a good tight joint between the courses. From this it is evident that with these shingles it is unnecessary to remove shingles already laid in order to make the middle sheet come to its proper place. If the mechanic in placing the shingles should carelessly get far enough out of the way to be noticeable in the general appearance of the roof, he can, by stretching the expansion or side joint more with one course than he had previously with another, work back to the proper adjustment.

The company also direct attention to the fact that the stiffness of the lower edge is not destroyed by cutting or pressing the notch in place. Accordingly, this shingle requires no additional stiffening, as in the form of a crown, as above referred to. The peculiar form of the serrations or ribs across the top of the shingle, it is claimed, affords a greater obstacle against the entrance of snow and rain than any other form heretofore introduced. The side lock is an expansion lock, and the shingles in place have more than $\frac{1}{8}$ inch each for expansion or contraction or for the adjustment of plates, where the courses have been carelessly got out of form. At the lower right hand corner of the nailing flange, a piece is cut off in order to allow the bent down portion of the next succeeding shingle to pinch tightly upon the raised platform of the course below. This construction secures a very close fit, and, it is claimed, is a much better protection against storms of all kinds than is possible to obtain, without the corner being cut in this way. This, we believe, is also a feature referred to in the patent now pending.

Items.

We are in receipt of a copy of the new catalogue issued a short time since by George Hayes, 71 Eighth avenue, New York City. The book is a substantial octavo, with cloth covers. While a full line of the goods of which Mr. Hayes makes a specialty is not presented, there is enough shown in this work to indicate to the most casual observer the wide range which his manufactures cover. The frontispiece of the book presents a view of the Hayes Pavilion, on the Centennial Grounds, Philadelphia, 1886. In the introduction skylights of large span are considered, and engravings are presented of skylights erected on the King Block, Denver, Col.; the Chicago Open Board of Trade, the train shed of the passenger depot of the C. & N. W. R. R., Chicago, and the train shed of the Pennsylvania depot, Chicago. This work, while done under the Hayes patents, was erected through the agency of the licensees in the city named. The Hayes skylight bars are presented, and following are applications illustrating the simple curb and also the curbed extension skylight. Tables are introduced giving the weight of a square foot of different materials, and also of round, square and angle iron per lineal foot. A conspicuous feature in the work is the illustrations of special applications of skylight construction. One of these is the skylight room in a photographer's gallery at Providence, R. I. Another is work done for Wm. Kurtz, photographer, of New York. Bay and oriel windows are shown, and also conservatories. Metallic ceiling lights are presented, and a view is also given of the office and store front of the Hayes establishment, with which our readers are already familiar, since a fine engraving of it was given in these columns a short time since. The Hayes ventilators for curbs of skylights and other purposes, tubular ventilators and ventilating louvres and other specialties are similarly illustrated. The latter part of the work is devoted to the Hayes metallic blinds, a number of illustrations of which are shown indicating the different applications that can be made of the different ideas. The work, taken as a whole, is very different from any work issued by other firms in the same line of industry, and contains many features of interest to the trade at large.

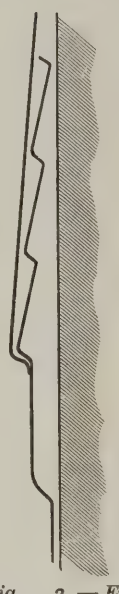


Fig. 2.—Enlarged Section through Upper Part of Shingle, Showing Overlap.

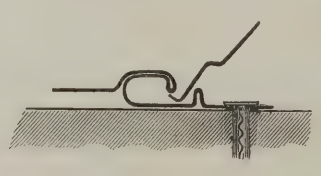


Fig. 3—Enlarged Section Showing Method of Making Side-Lock.

The Sagendorph Iron Roofing and Corrugating Company, of Cincinnati, on account of rapidly increasing business have recently sought larger quarters. They will occupy the site formerly belonging to the Western Paint Mfg. Company, J. A. Yingling & Co., and Bonney & Co., Nos. 15 to 17, inclusive, Public Landing, Cincinnati. The building occupied by these firms was destroyed by fire some months since, and the Sagendorph Company will clear away the ruins and build an entirely new manufacturing building, three stories in hight with basement. The building will be of iron, stone and brick. The dimensions will be 60 feet front by 200 feet deep. The company propose to fit up the new premises with machinery of the latest style, and with all the most improved mechanical devices necessary to the manufacture of their specialties, all to be operated by steam-power. A 30-horse-power engine has been contracted for for the purpose. An elevator 8 x 12 feet will provide ample facilities for the handling of iron from floor to floor. The following estimate of the capacity of the new establishment has been prepared by the company: Oil and paint, 1000 gallons per day; cement, 1 ton per day; corrugated iron, 1000 squares per day; standing-seam iron roofing, 1000 squares per day, and roll cap roofing, 500 squares per day. The basement of the building is to be occupied for the storage of oils, paint and cement, and the heavy machinery required will be located on the first floor. The second floor will contain the offices of the company, with shops for painting ironwork and machinery for the manufacture of cement. The third floor will be used as a cornice shop and for the manufacture of tin shingles.

The magnitude of the blasting operations occasionally necessary in slate quarries is indicated by an account recently published in the North Wales *Observer and Express*. We here append the statement there contained: "On Saturday blasting operations upon a gigantic scale took place at the Dinorwic Quarries, the object being the displacement of a huge mass of rock, which was unsuitable for working, and had become a source of danger to the workmen employed in its immediate neighborhood. Every preparation was made to secure the safety of the

Fig. 4.—Section through Side-Lock as the Shingles are Laid.

inhabitants and their property, and, acting on the advice of Colonel Ruck, the chief constable of the county, those resident in the immediate neighborhood of the quarry vacated their houses and left their doors and windows open. No one was admitted into the works except those who had the charge of firing. Traffic was suspended on the main road skirting the lake. The blasting was expected to take place at one o'clock in the afternoon, and about an hour previous crowds of people were seen wending their way up in the direction of Snowden, in order to secure commanding positions on the hills opposite the quarries, and thus obtain an uninterrupted view of the scene of the operations. At a quarter past one the huge rock, towering to the hight of 100 feet, was seen to quiver, and, amidst dense volumes of smoke, the whole mass fell in innumerable fragments. Not the least vibration was perceptible, and, to the surprise of the spectators, the noise of the exploding charge was not more than is heard during ordinary blasting operations in the quarry. The charge used was about 2 tons of gelatine, which is equal to about 18 tons of gunpowder, and the quantity of rock displaced was calculated to be 100,000 tons in weight."

Cooper, Hamsley & Co., Nashville, Tenn., call our attention to the fact that they have recently been awarded the contract for the tin and galvanized-iron work for the West Tennessee Hospital for the Insane, located at Bolivar, Hardeman County, Tenn. The letter-heads of the firm at present are printed with a general view of the building taken from the architect's

drawings. An idea of the size of the building will be gained by the statement that the line of the main wall, measuring around the building, is a trifle over ½ mile. We understand that the sheet-metal trade was represented at the letting by representatives from Chicago, St. Louis, Louisville, Memphis and Nashville firms. The Hamsley sheet-metal shingles are to form a prominent part of the covering of the building. The trimmings throughout this building are to be of galvanized iron.

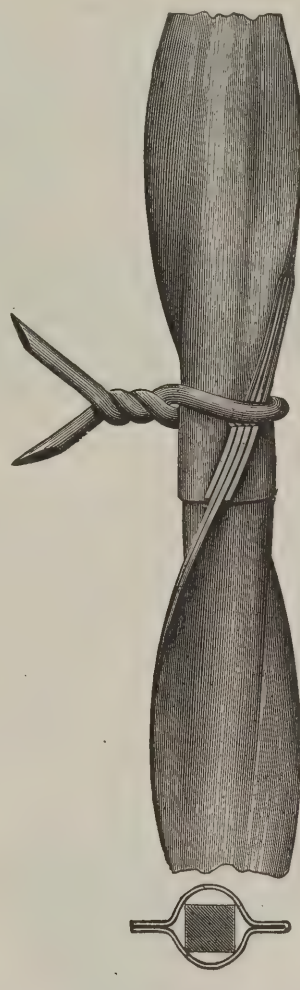
A LETTER recently received by the National Sheet Metal Roofing Company, of New York City, from George S. Colby, architect and superintendent, Wyandotte, Kan., is characteristic of considerable correspondence which has recently come to their hands. In answer to a request to give the new catalogue of the company careful examination, Mr. Colby writes: "I have specified your shingles for the last three years, and have just completed a building which used 35 squares of them. I have covered the City Hall, St. Maurer Hospital and three large residences in this town with them. I was the first to introduce Walters' metallic shingles here, and I still think they are a No. 1 article."

L. M. BOWERS, of the well-known firm of Hatten, Galpin & Co., of Binghamton, N.Y., has recently patented an improvement in eave trough angles or miters that is of general interest to the trade. The central idea is the construction of the joint between abutting lengths of eave troughs in a way to secure a perfect joint, and, at the same time, make it convenient of manufacture and shipment. The improvement consists in forming across the end of one piece and integral with it a rib to stiffen and strengthen the joint. The end of the trough is first cut to the proper angle and then, by means of a suitable brace, the rib is struck up on the metal, having its greatest strength and width at the center of the trough. The end of the arm of the miter is cut to correspond with the bevel of the main bed of the first part, the same as though no rib were used. The end is then lapped over on the trough and is soldered in the usual way. The free edge of the rib formed on the first piece is then soldered to the under-side of the second part, thus making a double soldered joint, with the added strength of the flanged rib across the lapped end.

AN IMPROVEMENT in eave troughs and leaders was patented not long since by John L. Holton, of New Lisbon, Ohio. The improvement relates to means by which troughs are made in suitable lengths and coupled together by means of metal strips, bent in the reverse direction and doubled back, forming folds to receive the opposing edges of the trough. The joint thus secured is said to be tight without soldering.

A VERY ATTRACTIVE BUILDING which has recently been completed in the upper part of the city is the Union Boat Club House, 136th street and Harlem River. This building was designed by John Sexton, architect, No. 1544 Broadway, New York. The roof is covered with Walters' patent metallic shingle, furnished by the National Sheet Metal Roofing Company, of this city, and is said to be not the least noticeable feature about the structure. The building is referred to by those who have seen it as attractive in its general features, and quite appropriate for the purpose for which it is intended.

IN THE MATTER of what constitutes a square of iron roofing, it has been charged that there was sufficient equivocation in the price lists of some of the iron roofing manufacturers to cause inexperienced dealers, builders or house owners to make mistakes in ordering material. It would seem that this charge is being rapidly removed, in the fact that price lists are now so worded as to make it impossible of misapprehending them. In a price list issued by the Sagendorph Iron Roofing and Corrugating Company, of Cincinnati, there is an illustration in point. The different kinds of roofing are very carefully described, including a statement of the extras that are furnished therewith without charge, and then there follows: "Per square as shipped, 100 square feet." There is also given with each item in the list the number of pounds to the square. Other price lists to which our attention has been recently called are similarly explicit in various particulars; all of which goes to show that there is at present no reason for charging the roofing companies with wilfully misrepresenting their goods for the sake of an increased profit.



Some Forms of Lightning Conductors.—Fig. 1.—Copper Conductor with Square Iron Core.

A CHANGE in the roofing firm known as The Warren Ehret Company, Philadelphia, took place the first part of this month. The reorganization, which is in the form of an incorporation under the laws of Pennsylvania, retains the same name, with office and store at 428 Market street, and factory at Thirteenth and Cumberland streets. The officers of the organization for the current year are as follows: President, John B. Lober; vice-president, M. Ehret, Jr.; secretary and treasurer, H. S. Ehret; directors: M. Ehret, Jr., George W. Elkins, George D. Widener, John B. Lober, Alonzo Gibbons.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, Cincinnati, Ohio, have issued a pamphlet entitled "Directions for Laying Sagendorph's Iron Roofing Devices and Applying Obelisk Paint and Cement Under Sagendorph's Process." The pamphlet is issued in the joint interest of the Cincinnati company above mentioned and also the Lloyd Iron Roofing and Corrugating Company, Chicago; the East Birmingham Iron Roofing and Corrugating Company, Birmingham, Ala.; the New York Iron Roofing and Corrugating Company, New York City, and the Minneapolis Iron Roofing and Corrugating Company, Minneapolis, Minn., all licensed and working under Sagendorph's patents. The pamphlet contains 12 pages and is handsomely illustrated. It gives specific attention to the matters indicated in the title.

Some Forms of Lightning Conductors.

The Munson Lightning Conductor Company, Indianapolis, Ind., manufacture a number of forms of lightning rods and fittings, some of which we illustrate in the accompanying cuts. In Fig. 1 is shown their ¾-inch patent copper tubular conductor, through the center of which runs a ¼-inch non-corroding iron core, as indicated by the cross section, which is part of Fig. 1. This rod is also made in ⅝-inch size. These conductors, it will be noticed, practically consist of two spiral flanges, rolled from copper, and of such a shape as to form a tubular core, through which runs the square iron rod referred to. A special feature of this conductor, to which the manufacturers direct attention, is that one of the flanges is open, which allows the collected moisture to evaporate quickly, and thus prevents the rapid corrosion of the iron core. The method of joining the sections of the rod is indicated in Fig. 2, which shows the separate sections and the wire-binder. The sections are slipped together, and the wire is fitted in the side slots and twisted tight. Fig. 3 shows a lightning conductor of somewhat similar construction, but without an iron core, the copper flanges being rolled so as to form a central tube of oval section, the double thickness of copper rolled as shown, making it amply strong. A center core, however, is inserted in the uppermost parts of these rods where they receive the points. The Munson copper cable is illustrated in Fig. 4. The cable is made of square copper wires with a square copper wire for the center one, or a round No. 9 wire as may be preferred. The special adantage claimed for this cable is the large number of sharp edges which it presents, it being generally accepted that the efficiency of a lightning conductor is very much increased by sharp edges and extended surface. We are informed that the Munson Lightning Conductor Company are the originators of quare and

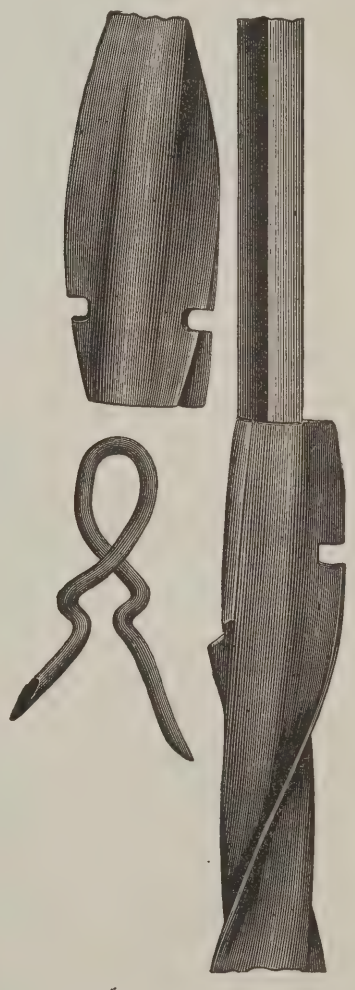


Fig. 2.—Showing Method of Joining Sections of Conductors.

corrugated wires. The top of the rods, except when fastened to the crestings or chimneys, are supported in a galvanized-iron brace consisting of a tripod, above which is a rod provided with two holders. The Munson Lightning Conductor Company also make non-insulating fixtures for fastening the rods to the sides of buildings.

Preservation of Wood by Lime.

A correspondent of the *Field* says: I have for many years been in the habit of preparing home-grown timber of the inferior sorts of fir—Scotch, spruce and silver—by steeping it in a tank—that is, a hole dug in clay or peat, which was fairly water-tight—

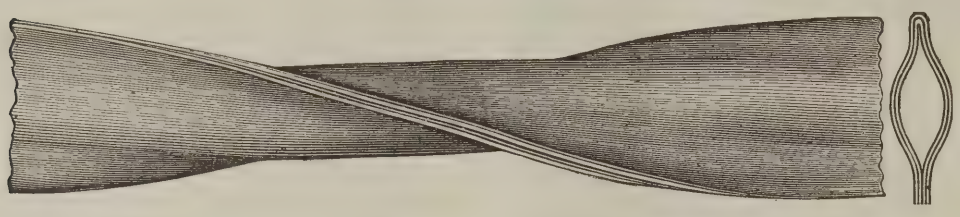


Fig. 3.—Copper Conductor with Hollow Core.

in a saturated solution of lime. Its effect on the sap-wood is to so harden it and fill the pores that it perfectly resists the attacks of the little wood-boring beetle, and makes it, in fact, equally as durable as the made wood. I have a mill which was lofted with Scotch fir prepared in this way in 1850, and it is in perfect preservation. The timber is packed as closely as it will lie in the tank, water is let in, and unslacked lime is thrown on the top and well stirred about. There is no danger that the solution will not find its way to everything in the tank. I leave the wood in the solution from two to three months, by the end of which time an inch board will be fully permeated by it. Joists and beams would, of course, take a longer time for saturation; but in practice we find that the protection afforded by two to three months' steeping is sufficient if the scantlings are cut to the sizes at which they are to be used.

How Mexican Houses are Built.

A correspondent of the Boston *Herald* says: It is evident to any one who goes about here that the population is overcrowded; the flat, or "vivienda," system, which is the same thing, is the rule. To live in a separate house is the exception. The demand for convenient little houses of from six to ten rooms is very large, and good rents are obtained. There is no doubt that a syndicate building houses on a large scale here could obtain excellent dividends. On economically built houses the net yield ought to be 7 or 8 per cent. The Mexican houses do not require those costly repairs which are necessary in the United States. As all the houses here are built of masonry, there is no woodwork to rot, and as there is no frost, there is no repairing of foundation walls. There are no chimneys to build, and no cellars or attics. The class of houses to build would be small one-story houses, each with its "patio," or courtyard, with a good-sized "sala," or parlor, medium-sized bedrooms and dining-rooms. Here every house has its range, of masonry, in the kitchen. In houses that would rent for $600 per year, the builders could well afford to place bath-rooms, which can be elegantly and very cheaply built, of Puebla tiles. Almost all modern houses here now have what are called English water-closets; that is, provided with water for flushing the soil-pipe. Also, in modern houses, wooden floors are used throughout, except, perhaps, in the kitchen. Experience has shown wooden floors to be more healthful than brick tile floors, such as are found in all old-fashioned houses. To an American house builder, the construction of a Mexican house would be simplicity itself. There is no costly and elaborate wood finishing, and very rare is the house here that contains any harder wood than common pine. Paint is sparingly used, and two thin coats (or rather, one priming and a thin coat) are about all that is employed. The glass is generally of poor quality. The houses are built on the principle that people live out of doors most of the time. There is this to be said, that the absence of intense heat renders the interior of one's house always comfortable.

Waxing Floors.

An exchange presents the following directions: Take a pound of the best beeswax, cut it up into very small pieces, and let it thoroughly dissolve in 3 pints of turpentine, stirring occasionally if necessary. The mixture should be only a trifle thicker than the clear turpentine. Apply it with a rag to the surface of the floor, which should be smooth and perfectly clean. This is the difficult part of the work, for if you put on either too much or too little a good polish will be impossible. The right amount varies, less being required for hard, close-grained wood, and more if the wood is soft and open-grained. Even professional "waxers" are sometimes obliged to experiment, and novices should always try a square foot or two at first. Put on what you think will be enough, and leave the place untouched and unstepped on for 24

Fig. 4.—Copper Cable Conductor.

hours, or longer if needful. When it is thoroughly dry rub it with a hard brush until it shines. If it polishes well, repeat the process over the entire floor. If it does not, remove the wax with fine sand-paper and try again, using more or less than before, as may be necessary, and continuing your experimenting until you secure the desired result. If the mixture is slow in drying, add a little of any of the common "dryers" sold by paint dealers, japan, for instance, in the proportion of one part of the drier to six parts of turpentine. When the floor is a large one, you may agreeably vary the tedious work of polishing by strapping a brush to each foot and skating over it.

The Prevention of Fire.

Chief C. T. Merrill, in a recent issue of the *Firemen's Herald*, discusses the prevention of fire in the following language: The importance of being always ready and on the watch for fire cannot be too forcibly impressed upon the minds of property holders, as well as those officials whose duty it is to see to such matters, and it should not be allowed to overshadow the paramount importance of preventing fires. It is as well to be prepared to fight fires as it is plagues, but how much better to employ that caution and prudence which render the chance for such calamities a remote possibility. Take the case of cholera. Should we be satisfied with simply providing skilled physicians, hospitals and other means for the treatment of the disease? Certainly not, but such a caution should not be overlooked; but to strike at the life of the plague we must endeavor to prevent its introduction in our midst. So with fire. Our first and chief effort should be to prevent its breaking out. To do this successfully, not only requires legal and moral restraint, but care in the construction of buildings, the handling of fire, and a thousand other things that come only to the notice of those who preside over the households. The average property owner has little regard for the safety of his tenants, his ambition is to put up his building with as little cost as possible, get the greatest amount of rent he can squeeze out of his tenants, and let them take their chances of roasting to death in their apartments. Speculative builders second the owner in his efforts, because they can make more money out of a "skin" job of building than they can out of an honest one.

So long as self-interests rule, private citizens have no rights that the average legislator is bound to respect. Add to this the political influence that must be consulted, and it is little wonder that our laws are faulty, or that some of them virtually offer a premium for recklessness and rascality. Nearly one-third of all fires are caused by incendiarism. These may, at least in a certain sense, be considered unavoidable. All, or nearly all, remaining fires may be looked upon as preventable, being mainly caused by carelessness or by defective building construction, or by defective heating or lighting arrangements. Defective flues stand at the head of this list, a fact which I desire to emphasize, as such fires would obviously not occur if the builder, the architect and mason would pay proper attention to the construction of chimney flues, and see if all woodwork is kept at a safe distance from, or that no joists are built into the masonry of flues, or worse, left to project into them. Take almost any block of buildings and we find its cellars and garrets used for purposes which endanger the safety of the whole of the buildings. Wooden pails and boxes filled with ashes, closets full of old paper and rags, and usually a liberal supply of coal oil, and generally a flimsy roof surmounting the whole, and most likely to facilitate the progress of fire. Only a short time ago one of our prominent merchants informed me that his insurance had been cancelled because of the dangerous condition in which the insurance inspector found things upon the upper floors. I would respectfully suggest that some competent person be appointed to look after such matters, and that as far as possible authority given him to enforce such regulations as will prevent in future such occurrences as alluded to.

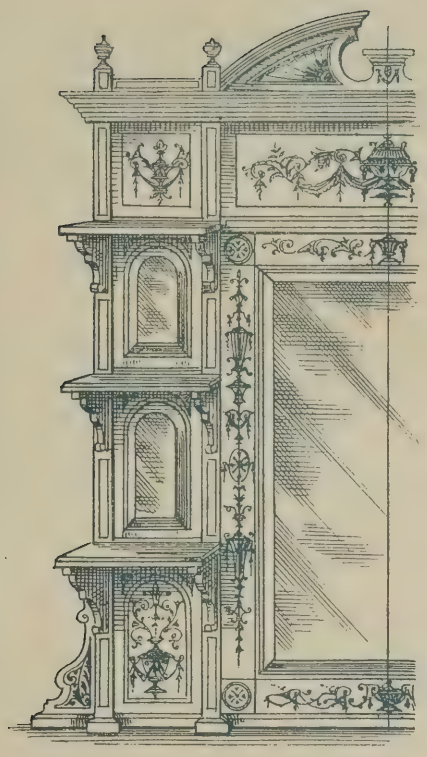


Fig 1.

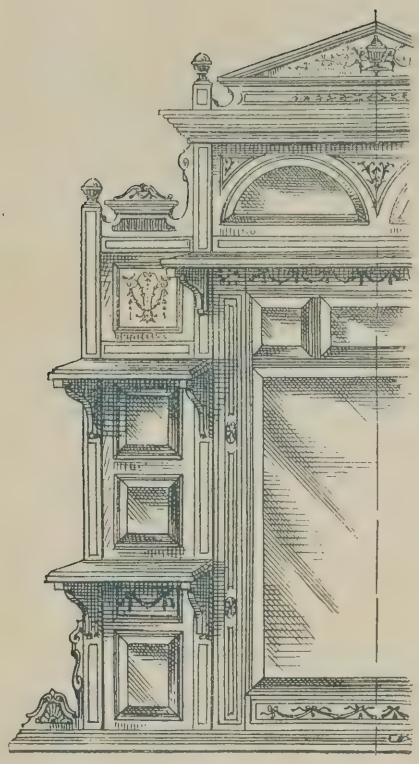


Fig. 2.

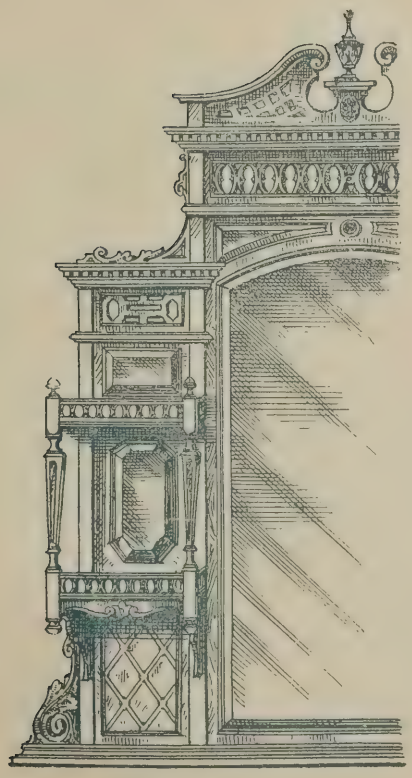


Fig. 3.

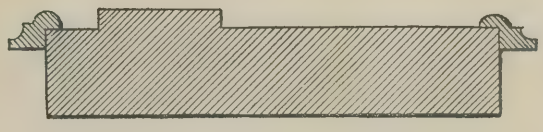


Fig. 4.

Fig. 5.

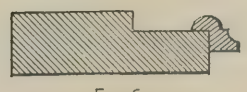


Fig. 6.

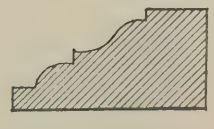
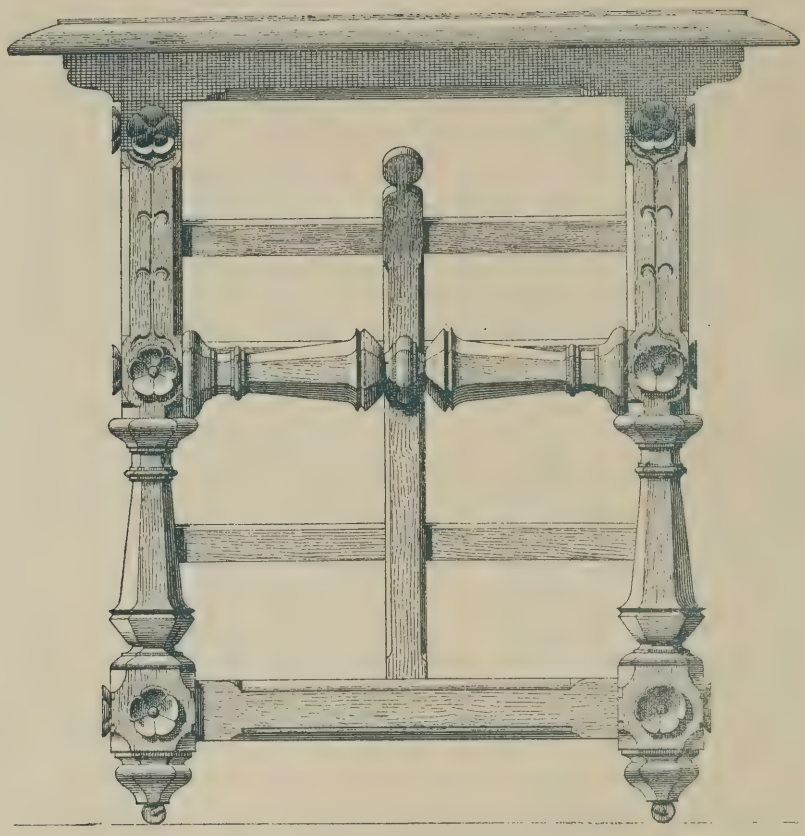
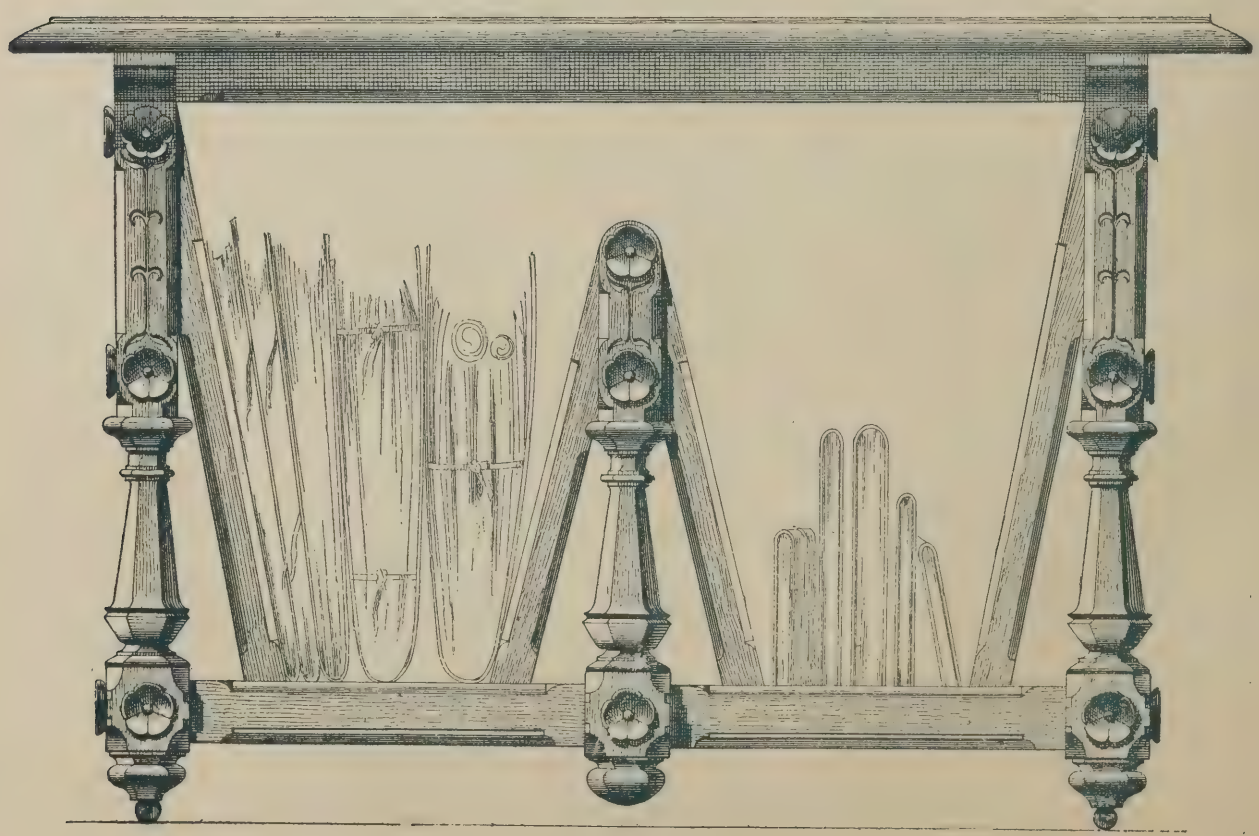


Fig. 7.

DESIGNS AND DETAILS OF OVERMANTELS.

For Description, see page 151.

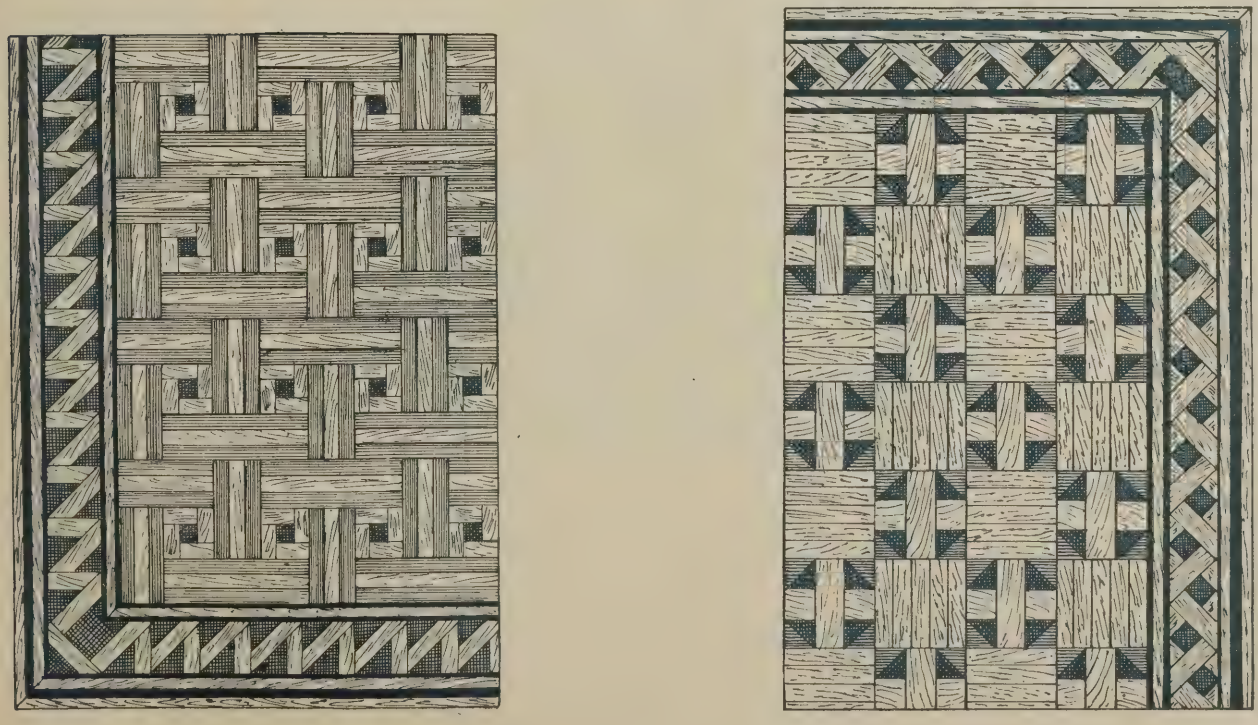




LIBRARY TABLE.

EXAMPLES OF JAPANESE CARVINGS.

See page 148.



Parquetry Floor Designs, by R. Fischinger.

STATUE OF JOHN HANCOCK,

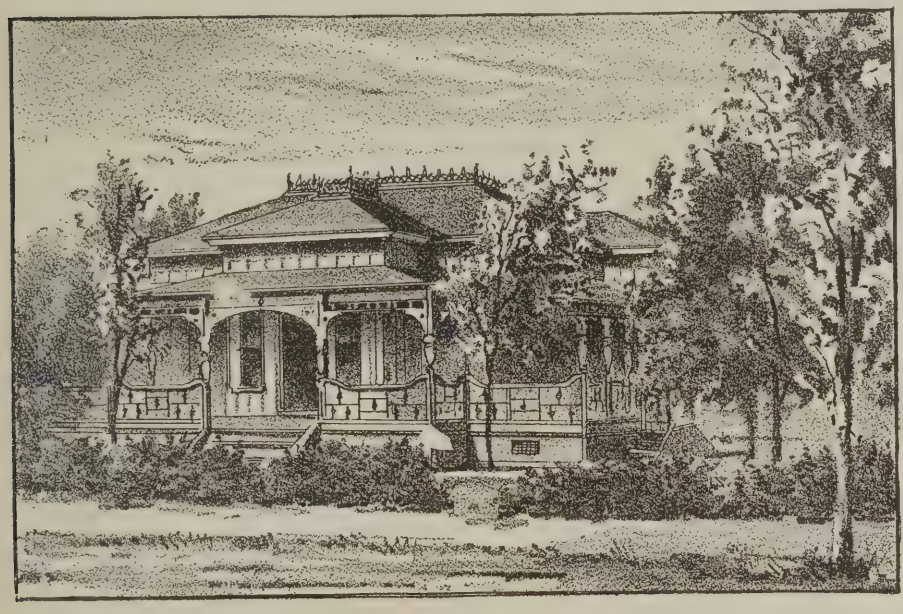
Executed in Sheet Metal by Bakewell & Mullins, Salem, Ohio, for the Court House at Findlay, in the same State.

Weary & Kramer, Architects, Akron, Ohio.

CORRESPONDENCE.

California Architecture.

From C. K., *Long Beach, Cal.*—I inclose the ground plan and exterior view of a typical California house, the exact dimensions and appearance of the one I am occupying. The majority of the dwellings in the larger cities and towns in California and



House Building in Southern California.—A Typical Residence.

in nearly all the local districts are similar to that indicated by the inclosed picture. They are only one story in hight, and have roofs running up toward the center from all sides. The style is so universal in its use that one longs for a change. I have thought that perhaps some of the readers of *Carpentry and Building* might not only be interested in the plan and view that I send, but that they might also be able to suggest some variations in the roof styles and in the exterior design of the house. What we are using may be described as a modified style of Mexican architecture.

Hardening Plaster Molds.

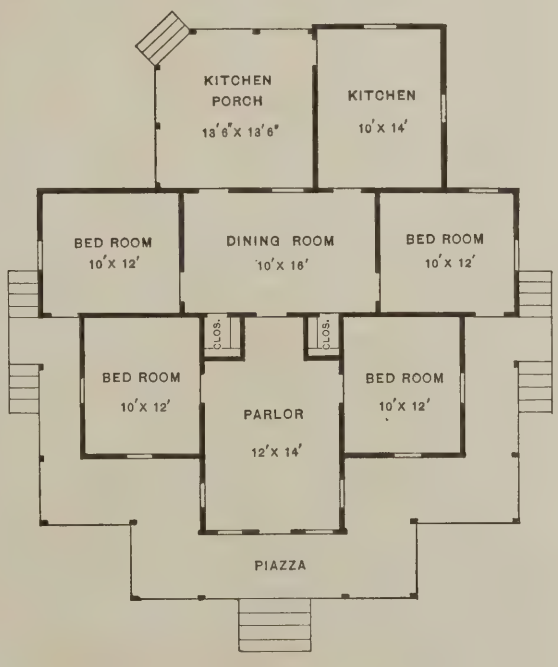
From H. C. B., *Baltimore, Md.*—Please inform me through the columns of *Carpentry and Building* how to harden plaster molds so that they will not wear rapidly nor become softened by water.

Answer.—One method which we would suggest for hardening plaster molds is to soak them in warm glue size until they are thoroughly saturated, and then allow them to dry. By so doing the plaster-of-paris is rendered very hard and tough. It would be necessary, of course, to use a glue that is not affected by water, otherwise the surface would be rendered sticky when in use. Perhaps our correspondent might accomplish his desired end by coating the molds with two or three coats of shellac.

Smoky Chimneys.

From T. A. T., *Berkley Springs.*—For the benefit of the readers of the paper who may have had the same trouble with chimneys that I have had, I will lay before them a chapter from my experience. Some time ago I asked for information in regard to a smoky chimney that I was trying to cure. I was using different patent chimney tops, but none of them proved of any advantage. In saying this I do not mean to condemn the chimney tops, but simply say that they did not answer the purpose in this case. The trouble seemed to be in the construction of the chimney itself. You will remember that I referred to one chimney in particular. The chimney in question was a great deal higher than any of the neighboring buildings. I did not want to use a stove in the room connected with this chimney, but instead desired to employ a fireplace. The result of a number of experiments, which it is unnecessary to narrate in detail, finally suggested the following experiment: I made a neat hood of sheet iron to fit under the mantlepiece, shaping it so that it dropped about 6 inches lower than the jamb of the chimney. As soon as this was in place there was not another word of complaint about the chimney.

Note.—With reference to our correspondent's narrative of experience, we would say that what he has written suggests that, in this case at least, there was a defect in the shaping of the fireplace, either in the proportions of the arch or the shape of the throat. Many of those who write us about smoky chimneys fail to examine them with reference to particulars of this sort before asking the Editor's assistance.



Floor Plan of California House.

Mechanics' Liens.

From F. F., *New York.*—I would like to know something about mechanics' liens or mortgages. Does a mechanic's or a builder's lien take the preference over a mortgage, or is the preference dependent upon the time of filing?

Answer.—The Mechanics' Lien law of 1885, general in its effect throughout New York State, distinctly limits the lien to be acquired under it to the right, title and interest at that time existing of the owner, whether owner in fee or of a lessee estate. A mortgageor owns only the equity of redemption, and a mortgage prior in date to a mechanics' lien is, therefore, the superior lien.

Apprentices vs. Trade Schools.

From S. C. P., *New York City.*—In discussions of trade schools and the apprentice systems the "pay idea" is frequently referred to. The idea of a tuition fee for a trade school is almost imperative, and should be generally considered. Its importance depends upon a principle of human nature, that men do not value that which has cost them nothing. It makes little difference in what department of human action the principle is applied, value is not appreciated when it is obtained by gift. It is found in all cities where free night art schools are in operation that one great obstacle is the difficulty of getting the pupils to take the whole course or to stay till the end of the term. Classes will be full when terms open, and even crowded. At the middle there will be great gaps, and, at the end, frequently only a fraction remains of the great crowd that entered. In this city the Metropolitan Art Schools encountered this difficulty years ago. The directors early found that their efforts were likely to be seriously impeded in a work where a course of study was imperative. In consequence, an entrance fee was demanded. The sum asked was in most cases considerable, though the value rendered was disproportionately large. The good results may be seen at any time at the close of a term. The classes are well filled at the beginning, and also at the end of the term. To make the school widely useful, and to reach those who are in earnest, yet are not able to pay, the management announces that the schools are "practically free." In other words, those who are able to pay are required to do so as an inducement to continue what they have begun, while for those who are in earnest and are not able to pay some "arrangement" will be made, which practically abolishes the pay feature—faithful attendance being practically the condition of release. The improved attendance, the increased interest, closer attention to the work and general advancement of the schools have demonstrated that this is the correct system for the art schools. It is a very important question whether this system, with modifications, is not the best not only for trade schools but for apprentices also. Up to the present time it has been taken for granted that as the apprentice is capable of earning something he ought to be paid wages. The evils of the system are too familiar to need mention. To a part of them may be traced the dying out of the apprentice system. If it were not for the desire and necessity of raising up a new generation of workmen few establishments would care to be troubled with apprentices. If the apprentice had to pay for the first six months or year of tuition it would entirely transform certain very annoying conditions. There would be more eagerness to learn and more of an incentive to teach. The system might introduce some new complications, yet I cannot now see any serious or even trifling troubles that would arise. At first the idea of making the boys pay for the first six months or the first year's instruction might seem strange, and would meet with opposition; yet it would in the end, I think, be the best for the employers and the boys themselves.

Extension Ladder.

From E. M. K., *Merill, Wis.*—To help our friend from Wakefield, Mass., in making an extension ladder, I suggest the following: Get the sides for the ladder 8 to 10 feet long. Bore for the rungs, commencing 3 inches from the ends. Mortise the end holes, and put a rivet through the end behind the hole or slot. Then put the rung in one step from the ends. Put the sections together much wider at the bottom than the top at both sides of the ladder. Let the top rung project through the sides the thickness of each side, and then let the bottom of the top section be placed outside of the top of the bottom section, as indicated in the sketch that I inclose. The slot of the bottom will rest on the extension of the rung through the side, and the slot in the top of the bottom section will receive the bottom rung of the top section. By this construction the inquirer may make his ladder as long as he chooses. The size of the sides is to be proportioned according to the length desired.

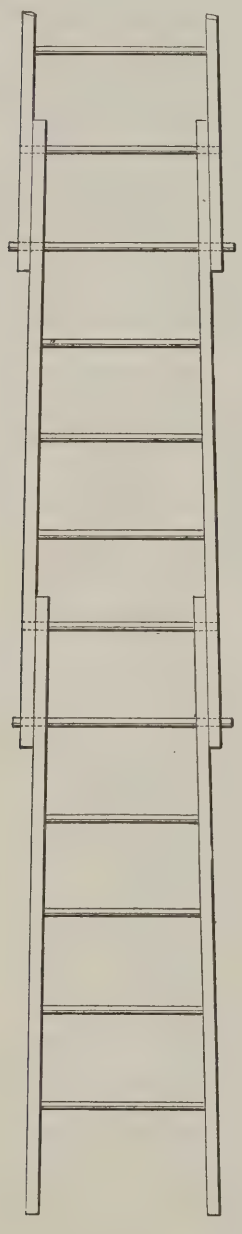


Fig. 1.

Fig. 2.

Extension Ladder Described by E. M. K.

From A. W. T., *Waitsfield, Vt.*—Inclosed please find the sketch of an extension ladder forwarded for the benefit of your Wakefield, Mass., correspondent. The ladder shown in the sketch is one that I have used with great success. Fig. 5 shows a section of the ladder; Fig. 3 shows two sections placed together ready for use, while Fig. 4 shows the side of the ladder and how to build it. I hope what I have presented will be of interest to your readers and also to "Brads."

Finishing About Chimneys.

From T. H. N., *Mystic Bridge, Conn.*—I took the job of tinning a roof for so much money in lump. I have got the roof done, but the chimneys have not been finished yet. Will some one please tell me if it is my business to tin around the chimneys when they get them through the roof?

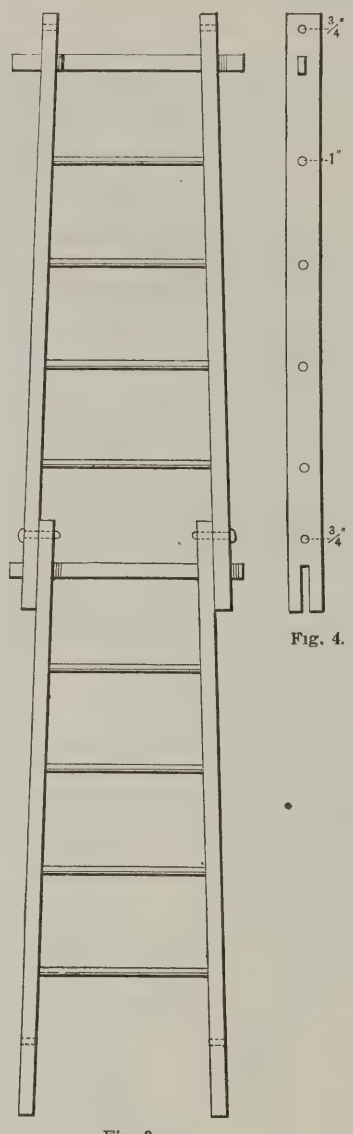


Fig. 3.

Fig. 4.

Extension Ladder Described by A. W. T.

Note.—Our correspondent has encountered an instance of bad management upon the part of the master builder, architect, owner or whoever has charge of the building in question. There is scarcely a rule of universal application in cases of this kind. Somebody is going to be discommoded, and in all probability the tinner will have to suffer. Since he undoubtedly agreed to tin about the chimneys in the first place and would have done so without any question had they been built when the roof was laid, it evidently belongs to his work to do this finishing. This said, however, there is no excuse for the chimneys not being built, as they should have been, so as to have all the work through at one time. As mentioned at the outset, it is simply a case of bad management, and we advise our correspondent to get out of the difficulty with as little loss to himself and with as little trouble with his customer as possible.

Trade Schools.

From H. B. B., *Livingston Manor, N. Y.*—I have taken much interest in the subject of trade schools. Living in the country as I do I have very little chance to know much about them, but I am inclined to think that they are a good thing and calculated to be a great help to young men learning trades. So far as learning a trade is concerned, particularly the tinsmith trade, in so short a period of time as six months, I do not believe it can be done, trade school or no trade school. When I commenced my trade I went for six months with a good man, receiving no pay. He believed he could teach me the trade in six months, and I am satisfied that he did his best by me. At the same time I was considered quick to learn; I was 24 years old and had some experience in handling tools. Before the six months were up I had made everything on the assortment list, and had done considerable jobbing. But, nevertheless, I was not a tinner, and to put me in a shop in the country and oblige me to do the variety of work that I am called upon to perform at present would have found me almost as helpless as a child. At the same time it may be fairly stated that I had learned the trade. I lacked experience, however, and practice, and that is just what the student of six months would lack, no matter what his school advantages were. I think the trade school is calculated to be a great help; but, it should be remembered that it cannot give a man experience, and experience is what makes a man an independent workman.

Measuring Stone Work.

From D. P. B., *Lyons, Kansas.*—Let me say a word about measuring stone in the wall. In this neighborhood we measure the wall, counting out large openings, and allow just the actual number of cubic feet in the wall. If the wall be 10 inches at one end and 20 inches at the other, we consider it as averaging 15 inches thick.

Ink Stain in Marble.

From J. H. W., *N. Y.*—Please inform me what will take ink marks out of marble.

Answer.—An expert in matters of this kind, in reply to a similar question a short time since, presented the following: If the stain is not very deep, take Javelle water, dip a stiff brush in it and then in finely powdered pumice-stone and give it a hard scrubbing, and then rinse off with pure water. If the ink stain is too deep to be thus removed, take a gill of ox-gall, or if that cannot be had, a gill of very strong soapsuds and half a gill of turpentine, and mix these with finely powdered pipe clay to make a soft paste. Rub this on with a stiff brush and leave it for a day or two. Then wipe it off with a cloth. If the ink still shows, repeat the operation again and again, until the marble is clean.

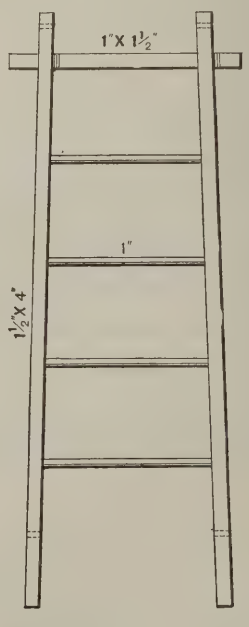
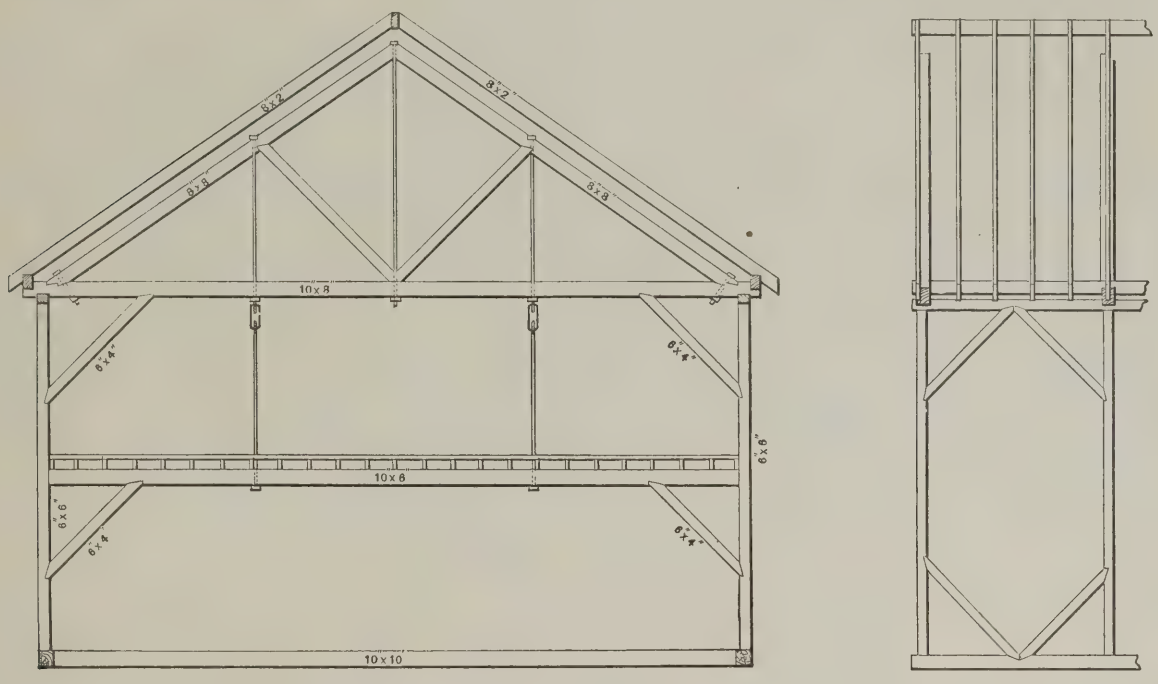


Fig. 5.—Single Section of A. W. T.'s Ladder.

Barn Framing.

From E. W., *Clinton, Mass.*—I have never seen a hay fork in use; therefore I do not know on what principle it operates. But for storing hay and having all the room in the barn there is I think the plan that I inclose might work satisfactorily. The whole structure might be supported by the trusses. The braces on the first floor are not really needed. Without them there would be one room 40 feet wide by whatever depth the building is made without any obstruction.



Barn Framing, as Explained by E. W.—End and Side Elevations.

Wearing Qualities of Roofing Paint.

From C S. R., *Newcastle, Pa.*—Will you please inform me of some way of quickly testing the quality of roofing paint, without spreading the paint on a roof and waiting for a period of time to see what change takes place?

Note.—We regret to inform our correspondent that we do not know of any way of overcoming the necessity of time in tests of this kind. If any of our readers have any suggestions to make, we shall be glad to hear from them.

House-Moving.

From S. A. M., *Fairfield, Tex.*—I believe no one has answered "T. H. R.," whose inquiry was published in the December number, on the subject of house-moving. I am a practical house-mover, but know of no such device as he inquires for. I use no windlass or capstan. I pull with two mules or with a team of horses, and can move almost any kind of wood building. I use common block and tackle rigging to suit the weight to be moved, anchoring by two or three posts or stakes. The first one is, say, 4 feet high. To this I tie a rope at the top, leading to the bottom of one driven 4 feet back of it. This process can be continued two or three times, or as often as is necessary to get the resistance. If your correspondent desires to know anything more of my method, I shall be glad to give freely of my knowledge, for I have received so many favors in the correspondence department of *Carpentry and Building* that I would like to contribute something to pay for what I have received.

Note.—We shall be glad to have our correspondent send forward sketches illustrating his method, without waiting for a specified question from our correspondent. There is never any danger of giving too many particulars when questions of this kind are up for discussion.

Treatment of Window Sash.

From H. S., *Napanoch.*—The sashes in my show window are of black walnut. I do not want to paint them if I can save them without this treatment. I have tried oil, shellac and other materials, but none of them seems to answer a good purpose. I do not know of anything that will protect the wood and not change the color.

Note.—The inference, from the way in which our correspondent presents his difficulty is, that the sashes are in use, and are already somewhat weather-beaten. Just what treatment to suggest, under these conditions, in order to accomplish what he has in mind, is difficult to say, more especially as certain treatments have been attempted already. If the wood were new, almost any painter or wood-finisher would be in position to recommend a treatment. In general terms, the plan would be to thoroughly fill the wood, using a term that is technical to the trade, and then, afterward, to cover the surface with a transparent water-proof coating. By this plan the wood would be hardened somewhat, and the surface made thoroughly weather-proof. We think consultation with a competent painter, perhaps, would be of benefit at the present time, and we offer the suggestion that the work be scraped or rubbed down, so as to relieve it of the present weather-beaten surface and to get at the new texture of the wood; then let the wood be treated the same as though it were new.

Concise and Easy Method of Estimating.

From W. H. G., *Brentwood, N. Y.*—I am a young mechanic entering upon the plane of active life for myself. I would be thankful if some of the readers of *Carpentry and Building* would give me, through the medium of its columns, a concise and easy method of estimating the cost of a building, including both labor and material. If I once obtain a systematized method of figuring I am confident all else will come easy enough.

Note.—We have not the least doubt of it. If you were well up in Greek, and had made it your life study so as to get at the systematized method of that language; or, if you had devoted yourself to mathematics, so as to get at the systematized method of integral calculus and other parts too intricate for the uneducated, we have no doubt that all else would come easy enough to you thereafter. Now, there is no more sense in talking about an easy and concise method of estimating than there is of a royal road to the acquisition of a language or proficiency in the higher mathematics. If our young friend is entering upon the plane of active life with such ideas in his head, we fear that only severe experience will correct him. He is certainly proceeding on the wrong path and is asking foolish questions. His conception of the realities of life is not adequate by any means. We are sorry that this is so, and are sorry to have to say these disagreeable things; but they are facts, and as such we obtrude them upon his attention. What he should do is to familiarize himself with every detail of the business—preserving records of everything he sees that bears upon the cost of doing work. In time he will know how work ought to be done, what it is worth when done, and how much it ought to cost in the doing. Then he will be ready to commence estimating. We know of no short cut.

Information Wanted.

From C. F. H., *Hickernell, Pa.*—I beg leave to make a want known through *Carpentry and Building*. I am anxious to get into more intimate acquaintance with my brethren in the trade. I am a young carpenter and house builder and am struggling along, with thousands of others in the same position. I have many trials to contend with, many wants to meet, and many times the things that I want to know I cannot find. What I would like would be for those who have had longer experience to write upon subjects which the younger men need to know about. In other words, let the correspondence be for the benefit of the younger, rather than solely in the interest of those who are able to take part in the discussion. Let my brother "Chips" speak up. Let their voices be heard; those who are old in the business. Remember the time when you were in my place and in the place of other struggling young men. Remember how, occasionally, you looked for something and could not find it, and how you would have rejoiced if some one of experience had tendered you the information sought. Do not assume, in your discussions in *Carpentry and Building*, that what you know every one knows—but, on the other hand, if you know a thing that is good for you, remember that it is certainly good for us other and younger men, and therefore, in our interest, make a statement of it.

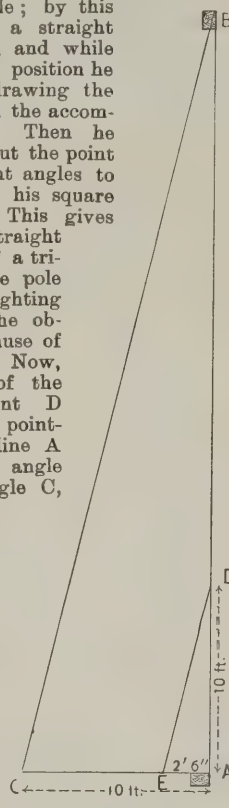
Gambrel-Roofs.

From A. W. K., *Albion, N. Y.*—I would like to correct one or two errors which crept into the description of the gambrel-roof designed and sent by me a few months since. Instead of $\frac{1}{16}$, it should be $\frac{1}{8}$ for purline posts. I intended to say that I would much rather have the purline run to the top of the

beam, instead of running to the sill. The reason is, that a barn constructed with beams will be stronger than without.

The Stake Problem.

From G. L. G., *Reading, Pa.*—A and B having placed their stakes. A puts one end of the 10 foot pole against his stake, pointing it to B, and sighting from A to B along the pole; by this means he obtains a straight line from A to B, and while the pole is in this position he marks along it, drawing the line A D shown in the accompanying diagram. Then he turns the pole about the point A, placing it at right angles to the line A D, using his square for the purpose. This gives him the second straight line, or the base of a triangle. Turning the pole at C, and again sighting back toward B, he obtains the hypothenuse of the triangle B A C. Now, placing one end of the pole at the point D and the other end pointing toward the line A C, he makes the angle E equal to the angle C, using his square for the purpose. He now has the two triangles B A C and D A E, similar in construction, from which he can take the proportion A C is to A E as A B is to A D; or, reducing feet to inches and substituting known quantities, we have 120 inches is to 30 inches as the required distance (A B) is to 120 inches. Working this out, we find that the unknown quantity is 480, or 40 feet, which is the distance between the two stakes, or the length of the line A B.



Stake Problem.—Diagram Accompanying Letter from G. L. G.

From O. W. R., *Brookfield, Mass.*—Referring to the accompanying sketch, A B represent the stakes at an unknown distance apart. Let A. measure from his stake at right angles to the line A B 10 feet, thus establishing the point D. Then, from the point D, place a square so that lining across one side of it, the line will cut B or the other side intersect the line A B prolonged, thus establishing the point C—in other words, forming a right angled triangle, with C D as the base. Then, there will be formed the following proportion: A C is to A D as A D is to A B—or, in other words, the distance from A.'s stake to B.'s stake.

From J. F. M., *Paterson, N. J.*—A way to crack the nut proposed on page 118 of the May issue is as follows: Referring to the accompanying sketch, X and Y represent the location of the two poles. First sight along the rod from Y to X; then lay the rod at right angles to the sight line by aid of the square, as shown. Then sight along the rod from the point Z, which is 5 feet or 60 inches from Y to X, and then lay the square as shown, noting where the rod intersects the square at Z—in this case 6 inches. Then we have as 6 inches is to 24 inches, so is 60 inches or 5 feet to the distance between the poles. Figuring this out, we find t at the required quantity is 240 inches, or 20 feet, as marked on the sketch.

From E. B. G., *Farwell, Mich.*—In the June number of *Carpentry and Building* "S. J. B." presents a stake problem, and wants to know if any of the readers of *Carpentry and Building* can explain it? To be sure we can. Lay the pole at B.'s stake at right angles to the line of the stakes. Now, lay the square transversely on the pole any convenient distance from the stake, so that the tongue and blade will cross the pole when the blade is in line with A.'s stake. Then the figures on the squares where it crosses the pole, are in proportion with the distance from the square to B.'s stake and the distance between the stakes. They are in direct proportion, as stated, because, the angles of the imaginery line at A.'s stake is the same as the angle between the tongue of the square and the pole. The statement would read thus: As the figure on the blade is to the distance from the square to the stake, so is the figure on the tongue to the distance between the stakes. Supposing the blade on the square is laid 8 feet from the stake, and the figure on the blade is 2 inches and that on the tongue is 16 inches, then we would have the following: As 2 : 8 :: 16 : x or 64 feet, which is the answer?

From J. A. M., *Cleveland, Ohio.*—If "S. J. P.," in cracking the nut that he proposed will proceed as follows, he will have no difficulty: Measure off 10 feet at right angles with A and B. Then place the square with 1, 2, 4 or 6 inches with the end of the 10 feet and with the blade parallel with A and B, the heel of the square being toward A. Then where the line crosses the tongue and blade, from the end of the 10 feet in line with B will be the exact proportions the stakes are apart. Suppose the line 10 feet from A crosses the tongue 1 inch from the heel and 24 inches on the blade, then proportions will be as follows: 1 inch is to 10 feet as 24 inches is to the distance the stakes are apart—or, in other words, 240 feet.

Construction of Walls.

From A. R. B., *Cuyahoga Falls, Ohio.*—I desire to ask if a good job can be made by using flooring covered with cloth and finished with paper in side walls and ceiling instead of plastering.

Answer.—Our correspondent gives very brief particulars and does not indicate as satisfactorily as he might the standard by which the work can be judged, so far as concerns its character. A good job can undoubtedly be made on the general plan suggested. That is good for the kind. In turn, there are plastered walls and plastered walls, and, in some instances at least, it would be unfair to compare any partition, however finished, with a plastered wall. The suitability of the wall is to be taken into account as well as its appearance. Assuming that sufficient stiffness can be obtained to make the wall satisfactory, there is no trouble whatever in securing a good foundation by the use of cloth. The cloth must be of good quality muslin, and very carefully stretched. One thing to be avoided is the cracks in the paper, which is always caused by shrinking in the paper, when the paper is applied direct. This end is secured by fastening muslin only at the top and bottom and at the sides. No tacking is to be done through the center of the cloth into the partition. The same treatment applies to the ceiling. Work put up in this manner presents a very satisfactory appearance; but is open to some objections. If the partition is not made perfectly tight on both sides, there is the chance on windy days of the cloth and paper bulging out away from the woodwork. The ceiling in some cases will bag and hang, no matter how thoroughly the cloth was stretched in the first place.

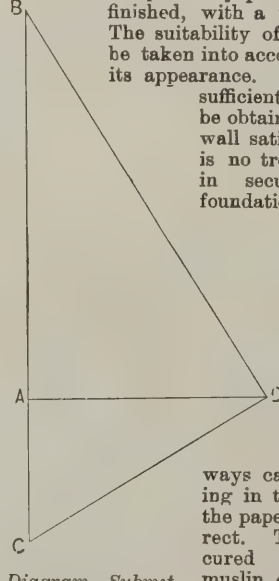


Diagram Submitted by O. W. R.

REFERRED TO OUR READERS.

Condensed Estimates.

From X. Q., *Hamilton, Ont.*—I would like to ask the readers of *Carpentry and Building* for a copy of the shortest, most condensed, every-day practical system of estimating—something that can be used in just as few lines as possible.

Sash Hanging.

From L. T. K., *Alluwe, I. T.*—I am puzzled on a job of sash hanging, and I come to the readers of *Carpentry and Building* for practical help. I have some twin window sashes to hang for the first time, and, contemplating them in the light of the published correspondence of *Carpentry and Building*, I am thrown clear off the track. If I had never seen anything to the contrary, I should have used a twin weight equal in weight to one of the sashes; but I find in the July number for 1881 an article from "J. B. Shannon," of Philadelphia, who said that the twin weight should be equal to two-thirds the weight of both sashes. Then in the August issue of the same year comes "P. T. B.," who claims that the twin balance only needs to equal the weight of one sash. Now, the question is, Which is correct? I want to hang my sashes so that they will work nicely. Also, how should the balance-weight be attached to the cord of the twin sashes?

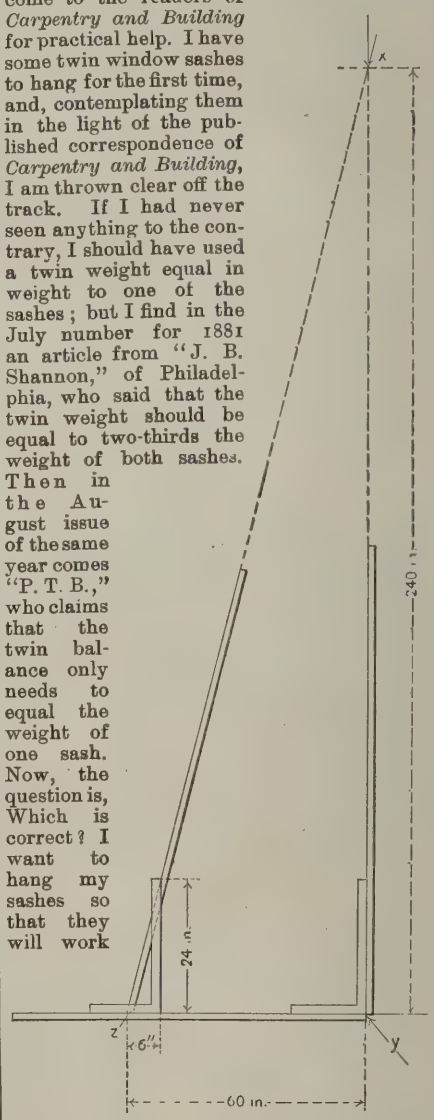


Diagram Accompanying Communication from J. F. M.

Staining Brick Work.

From E. N., *London City, Canada.*—In staining red brick work, what are the best materials to use, and what are the proportions to be followed? How is the stain made up and used? Should it be applied at once when ready, or should it stand for some time? If the latter, how long?

Inside Sheeting.

From S. F. B., *Wellington, Ohio.*—I have never yet known an architect to specify sheeting on the inside of a building. Some builders, however, in this vicinity are doing

work in this way, and call it right. I claim that it is not right, and think that there are strong arguments against it. I would like to see the subject agitated in *Carpentry and Building*.

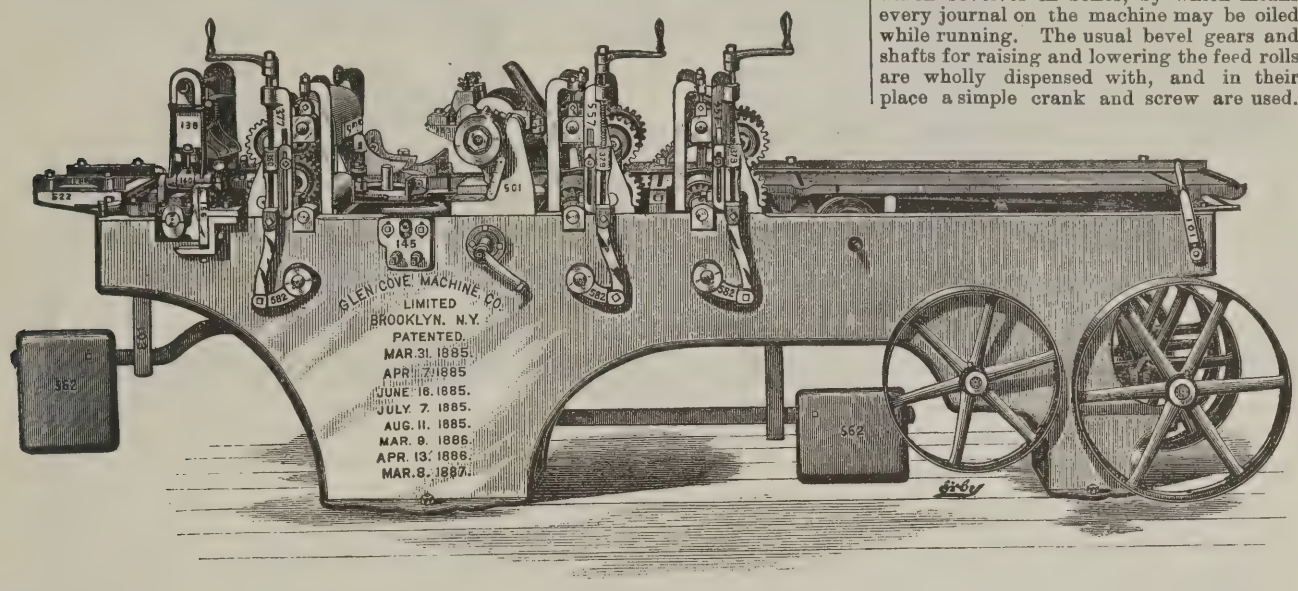
Black or Red Mortar.

From F. W. S., *Greencastle, Ind.*—I would like to learn from the practical readers of *Carpentry and Building* means for making black and red mortar. I am aware that prepared goods of this kind are in the market, but I am under the impression that there are coloring materials in common use obtainable in all towns and cities, which are available for the purpose. This being the case, I would like to know how to color my own mortar? I shall be under obligations to the readers of the paper for the information furnished.

NOVELTIES.

Special Flooring and Ceiling Machine.

It is not often that we have the opportunity of presenting as complete illustrations of wood-working machinery as are contained in the cuts of the Special Flooring and Ceiling Machine, made by the Glen Cove Machine Company, Limited, Nos. 28 and 30 Clay street, Brooklyn, N. Y., which are shown upon this page. Fig. 1 which shows a side elevation of the machine, is the equivalent of what is ordinarily put forth with machines of this kind. Figs. 2 to 6 are additional to it, and show how the machine is constructed with reference to special features peculiar to the work produced by the company named. The machine in question has been specially designed for flooring, ceiling and that general class of work. It has six feed rolls, geared at both ends with gears cast from iron cut patterns. The company claim that the trouble which every operator has experienced with expansion gears that revolve on a shaft has by this construction been entirely avoided. In this machine the gears are secured to the shaft which revolves in boxes, by which means every journal on the machine may be oiled while running. The usual bevel gears and shafts for raising and lowering the feed rolls are wholly dispensed with, and in their place a simple crank and screw are used. The pressure bar or chip breaker before the cut to the top cutter head is adjustable close to or away from the cutting circle upon a bar supported by radial arms free to raise and lower to different thicknesses of lumber. The bar on the back side of the top cutter head and those on each side of the under cutter head are supported in housings cast solidly together, and made adjustable to and from the cutting circle head to permit the use of molding, beading or rabbeting cut-



Novelties.—Fig. 1.—Special Flooring and Ceiling Machine, Built by the Glen Cove Machine Co., Limited, Brooklyn, N. Y.

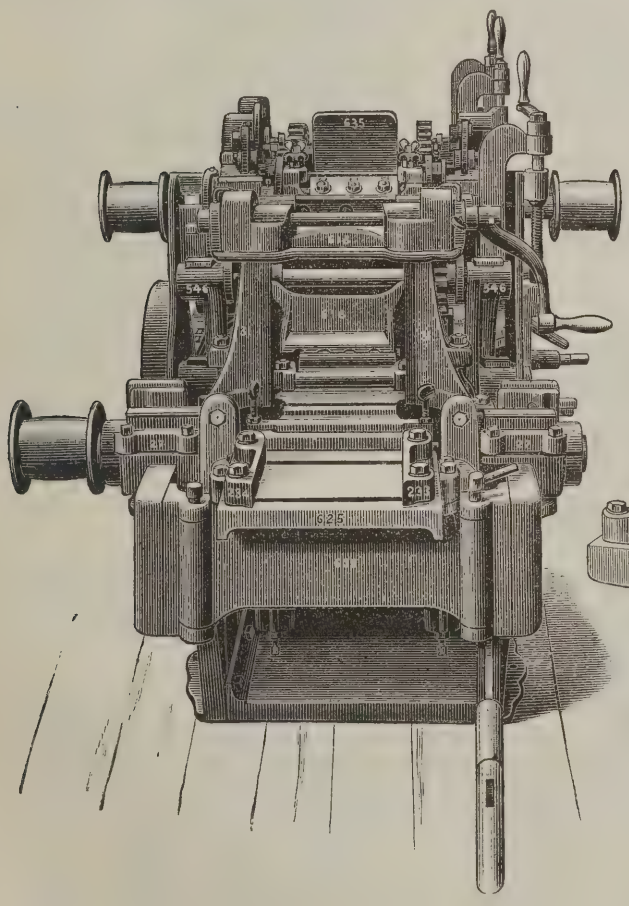


Fig. 2.—View of the Front End of the Machine Closed.

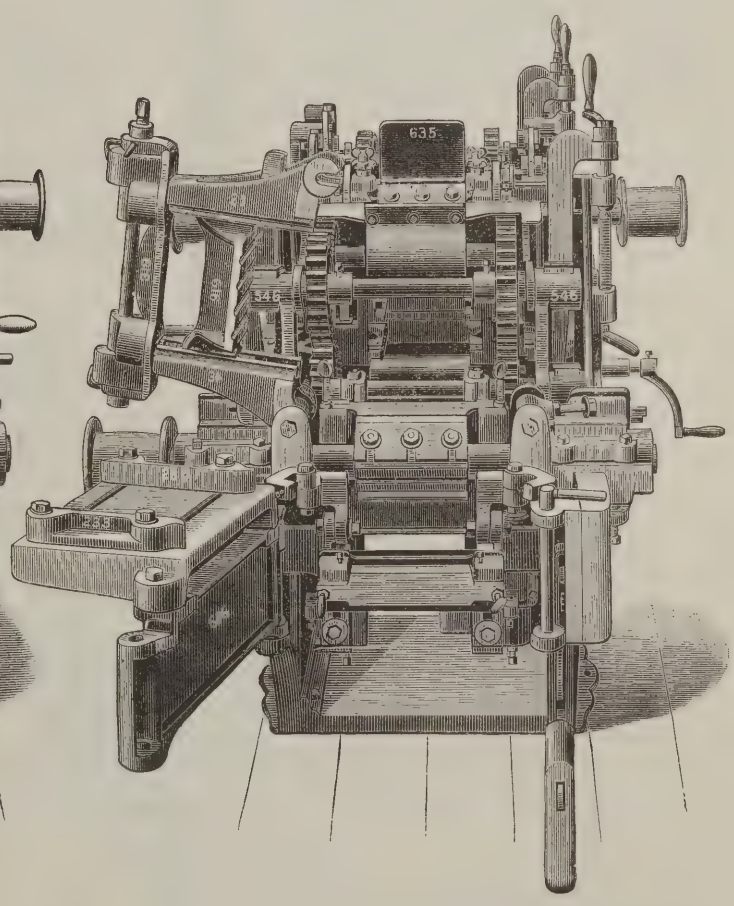
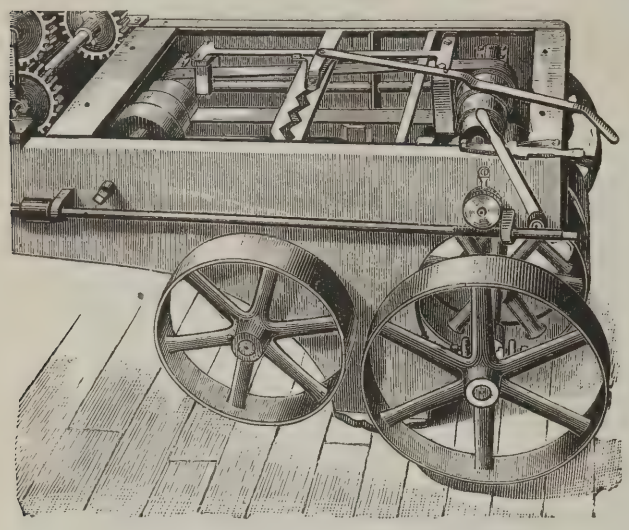


Fig. 3.—Front End Thrown Open, Showing Access to Under Side.

ters. There is placed above each matcher plate an adjustable pressure bar extending past the cut of the side heads. This presses on the board at its edge only, holding it firmly down on the matcher plate, thus compelling a perfectly straight cut by the side heads and always in the right place. A peculiar feature which will be noticed by a close examination of the engraving shown is that all parts of the machine are numbered. The construction system of the company is such that duplicate parts can be furnished which will fit, and these numbers are put upon the illustrations in order to facilitate supplies of this kind. Referring to the engravings, Fig. 2 shows the front end of the machine closed and ready for work. Fig. 3 shows the front end of the machine thrown completely open, giving free and unobstructed access to the under cutter-head for the purpose of setting or sharpening the knives. Fig. 6 shows the top cutter head-



Novelties.—Fig. 4.—Variable Feed Works Used in Glen Cove Machine Company's Flooring Machine.

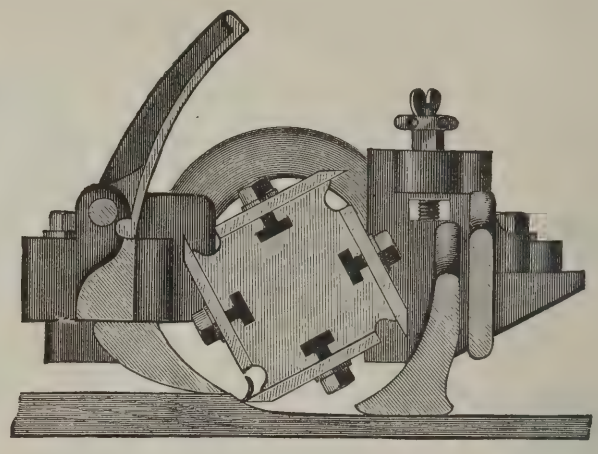


Fig. 5.—Top Cutter Head Work with Adjustable Pressure Bar and Chip Breaker.

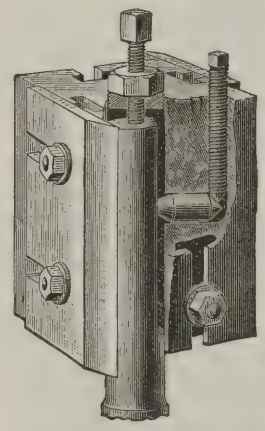


Fig. 6.—Device for Fastening Side Heads to the Spindles.

work with adjustable bar and chip breaker. Fig. 4 shows the variable feed works, indicating the manner in which the rate of feed can be changed to different speeds instantly while running. The device employed for fastening the side heads to the spindles, and which does away with the old set screw, is illustrated in Fig. 6. Many of the features shown in this machine are common to the entire series produced by this company.

Emerson's Patent Inserted Tooth Cross-Cut Saw.

Emerson, Smith & Co., Beaver Falls, Pa., are about to put on the market the saw named above, and illustrated in the cuts given herewith. It will be observed that it is a new departure in cross-cut saws. Fig. 7 represents a portion of a cross-cut saw with inserted teeth, from which it will be observed that all the teeth are a removable section which is held in place in the body of the saw by holders, as shown, one on each side, alternately, of the section containing the teeth. Fig. 8 represents full size a portion of one of these toothed sections which is made with the twin clipper tooth, other sections being made with coarse peg tooth, fine peg tooth and clearer tooth. As constructed, it will be seen that any section of the teeth may be easily removed and another substituted. In order to secure a satisfactory attachment of these sections of teeth to the body of the saw, about one-third of the width of the attached section containing the cutting teeth is beveled back to a sharp edge, and each holder is also beveled on alternate sides, so as to fit exactly the beveled section containing the cutting teeth. The toothed section also has three holes, one in the center and one at each end, while the body of the saw has three small steel pins attached and riveted to it in such a way that when the section containing the cutting teeth is forced into the saw, these pins engage the toothed section and hold it firmly. By this means cutting sections are attached and removed by hand without the use of any tools, and, it is stated, in less than two minutes' time. The body of the saw that carries the sections is made of steel one gauge thinner than the sections, so as to secure the free running of the saw. The removable sections are described as made from a superior quality of steel, 13 gauge, filed, set and ready for use, and the point is made that they are furnished at a less price than it costs to gum any crosscut saw and sharpen it. It is also pointed out that at a trifling expense fine and coarse teeth and teeth of different patterns can be used with one saw. Descriptions of these saws are given in the company's catalogue, and also large illustrations in their Japanese supplement. These saws have been sold to some extent to consumers and their merits tested, but the company intend the coming season to offer them to the trade, and are making arrangements for their manufacture on an extensive scale.

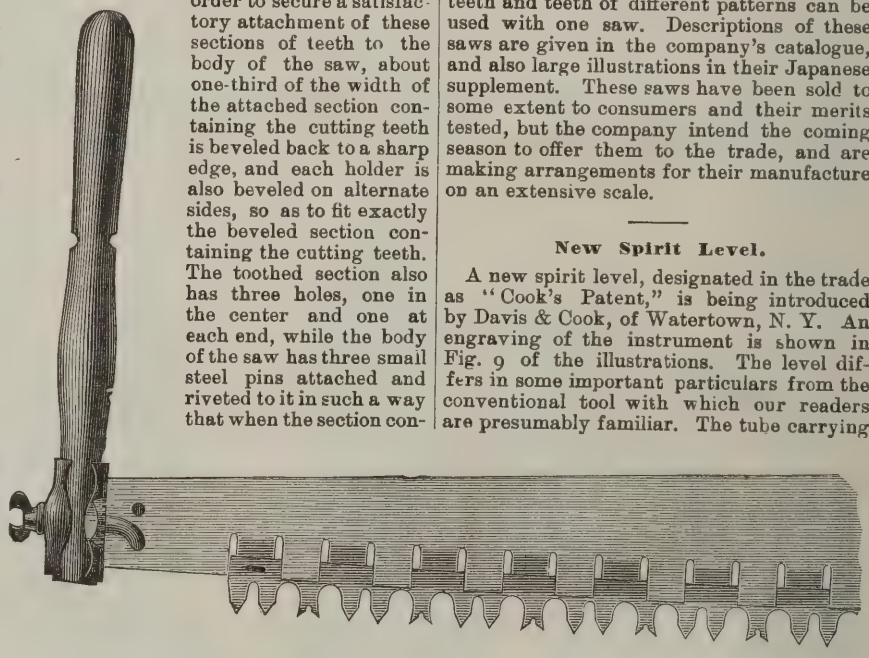


Fig. 7.—Emerson's Patent Inserted Tooth Cross-Cut Saw.

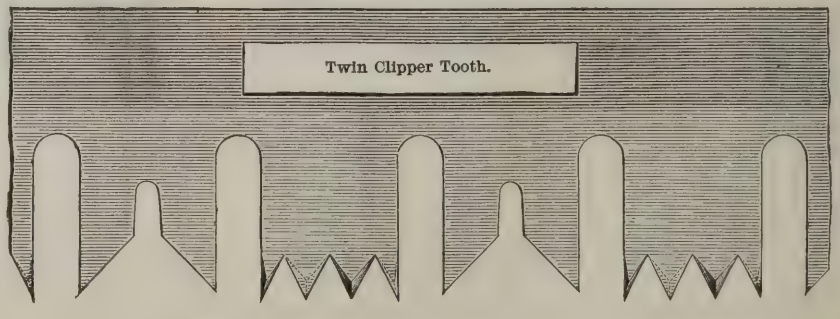
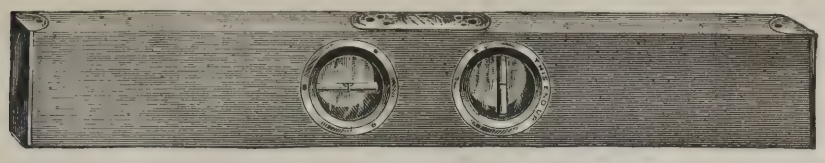


Fig. 8.—Portion of Toothed Section, Full Size.

New Spirit Level.

A new spirit level, designated in the trade as "Cook's Patent," is being introduced by Davis & Cook, of Watertown, N. Y. An engraving of the instrument is shown in Fig. 9 of the illustrations. The level differs in some important particulars from the conventional tool with which our readers are presumably familiar. The tube carrying the bubble is set in a frame, which is faced with glass on either side in the body of the stock. Accordingly, in using the level, instead of looking at the top and down into a narrow groove, as is usually demanded, the eye is directed to the side, and sees the bubble in a clear light, noting its position with reference to a mark around the tube.

Two of these tubes are used in the level—one for leveling, and the other for testing vertical lines. The position of the tubes is clearly indicated in the engraving. The



Novelties.—Fig 9.— Cook's Improved Level.

parts holding the tubes are arranged with screws, which reach to the plate on the upper edge of the stock, so that the level is adjustable, thus making it possible to correct for any inaccuracy occurring from any cause. The makers direct attention to these features, particularly with respect to the location of the bubble and the chance to look through the glass plates, as being especially desirable in miscellaneous lines of work, and also in such special work as lining shafting. The level can be used in many positions which it is not possible with the ordinary article. The sample before us is handsomely trimmed with nickel-plated furniture, including end pieces on the stock, indication of which is afforded by the engraving.

Tucker Awning Blind-Hinge.

The Hamblin & Russell Mfg. Company, Worcester, Mass., are putting this article on the market. Its special features and some of its parts are represented in the accompanying illustrations. Fig. 10 shows one of

Fig. 10.—The Tucker Awning Blind Hinge.

the positions in which it is adapted to hold the blinds, and indicates its use in a general way. Fig. 11 represents an upper hinge, from which it will be seen that it permits the

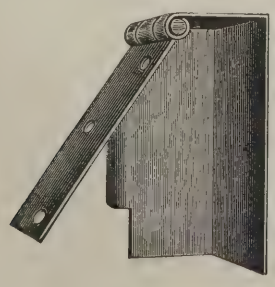


Fig 11.—Upper Hinge.

usual lateral movement of the blinds and also allows them to be placed in the position shown in Fig. 10. Fig. 12 represents the lower hinge, which is seen also in Fig. 11, detached from the blinds when they are placed in the position represented. The button-plate and button by which the lower hinge is fastened to the blind is shown in Fig. 13, from which it is obvious that it can very readily be connected and disconnected. Rods are also supplied for the purpose of holding the blinds, as shown in Fig. 10. These blind hinges are

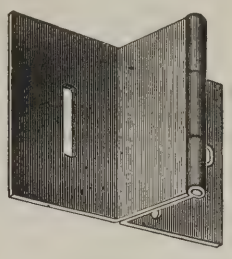


Fig. 12.—Lower Hinge.

made of the following numbers and styles: No. 1, frame house, blinds hung on outside of casing; No. 2, frame house, blinds that shut in flush with casing; No. 3, brick house; No. 4, single blinds. The fixtures are galvanized, and described as made of No. 15 gauge plate steel, thus obviating liability of breakage. The simplicity of their construction, neatness of appearance, ease of application, and satisfactory working, are points made for them by the manufacturers.

Fig. 13.—Fastening for Lower Hinge.

Cast-Iron Piazza Work.

Some years since cast and wrought iron work for the construction and embellishment of piazzas, verandas, &c., was quite popular. A little later, having been somewhat overdone by ambitious manufacturers, it went out of date, and the place it occupied was filled almost entirely by construction in wood. At present the current seems to be setting in the opposite direction, and many architects and builders are employing cast iron work much more requently than at any time in the past. Accordingly, different establishments are catering to this demand and preparing new designs and issuing catalogues. The accompanying engravings are from new work put out a short time since by J. E. Bolles & Co. of Detroit, Mich. Fig. 14 represents a column of a piazza with open spandrel and frieze work, surmounted by a cornice, and above this an iron cresting. Fig. 15 represents the base of the column and the balustrade that is used with the same. The progress that has been made in the pattern-maker's art within the last few years, to say nothing of the improvements in the processes of manufacture and in the conduct of foundry work, render such construction, as here illustrated, very appropriate and in keeping with the architectural ideas of the day.

Fig. 14.—Cast Iron Piazza Work.

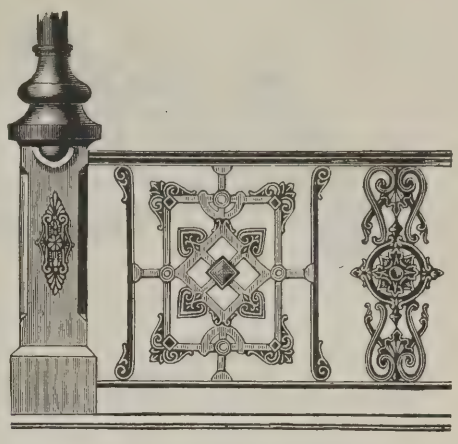
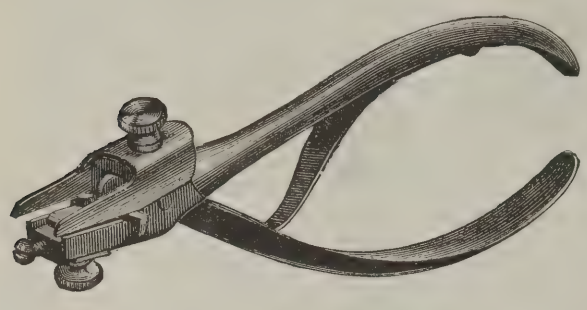


Fig. 15.—Cast Iron Balustrade.

The Leopold Saw-Set.

The American Mfg. Company, Twenty-second street and Washington avenue, Philadelphia, Pa., are putting on the market a new saw-set which is illustrated in the cuts presented herewith. Fig. 16 gives a general view of the saw-set, and Fig. 17 represents it in connection with a saw which is being set. The general features and operation of this tool are thus indicated: There is a steel saddle which is used in holding the saw in place, and which can be regulated by a set screw to accommodate any size of thickness of saw. The manner in which adjustment is effected for the different size and set of teeth is also indicated. As will be inferred from the illustrations, the lower arm or handle of the saw-set is the lever by which the power is applied, and terminates in a jaw made of forged steel, which comes against the upper side of the saw-tooth, the lower side of which rests on a cast-steel anvil, the precise location of which is determined by the set screw shown. In this manner the proper set is readily secured. The special features which are claimed for

this tool are its decided action, and the ability of the user to operate it with ease without danger of the breakage of the saw-teeth. On this latter point special emphasis is laid, and it is claimed that, with ordinary care,



Novelties.—Fig. 16.—The Leopold Saw-Set.

the hardest saw may be set with ease and without the breakage which so often results in the use of other sets. The Lloyd & Sup-

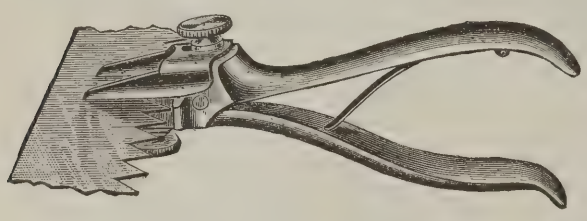


Fig. 17.—The Leopold Saw-Set with Saw.

plee Hardware Company, 503 Market street, Philadelphia, are agents for the sale of these goods.

Wood Seat Adzer.

The Rollstone Machine Company, of Fitchburg, Mass., are introducing an improved form of their wood seat adzer, an illustration of which is presented in Fig. 18 of the engravings. The device is largely used in the manufacture of wood seat chairs and in similar work. It is adapted for hollowing out all forms of wood seats, and, it is said, does its work in a thorough and rapid manner. The legs of the machine are of iron and the body of hard wood. The carriage is operated on a round bar, so that there is little friction. The work is placed on the carriage and held down to the cutter head by means of a clamp. The form of the hollow is regulated by the patterns and guide, and also by changing the form of the knives. We are informed that the pulley is 5 inches in diameter, and that it makes 4000 revolutions per minute. The weight of the machine is 400 pounds.

Fig. 18.—Wood Seat Adzer or Hollower.

A new building in Charlestown, Mass., occupied above the first floor for the storage of agricultural implements, suddenly fell recently, as supposed, from the drawing out of the truss-bolts intended for the support of the floor. Three timber trusses were introduced in a distance of 48 feet, and the pressure on them was 15 tons.

Enameled or glazed bricks, for outside or interior decoration, are made by applying to the surface a flux, which, during the burning, causes the silex to melt and form a vitreous covering. Such flux is easily colored, and thus very beautiful fancy bricks produced.

The Ideal House of the Future.

There is no doubt, says Helen Campbell, in the May *Cosmopolitan*, that the ideal house of the future, whether large or small, will be in the country, and that this massing together of humanity, to be found now in our great cities, will come to be considered simply barbarous. Even for the rich, who can claim fullest space, the city, with its undercurrent of crowded, festering, noisome life, holds contamination; while for the poor themselves, what word is strong enough to express the degradation of the word home that is theirs! Nor is it possible, even under the most favorable circumstances, to count "flats" or apartments as anything more than the travesty of comfort in its best sense. Ruskin is right when he denies to cities any possibility of the best development for human life; and though they have their uses and we could ill dispense with many good things to which they have given birth, they are responsible for such hideous evils that one longs at moments to see them, their pride and their magnificence, and "the bitter cry of outcast" life in their midst, engulfed like those lost cities of old. The home spirit is strong in many a city flat, and consecrates many a stately mansion as well as the narrowest tenement, but the true home must be in the country, quite accessible, it may be, from the city, but always owning certain indispensable and inalienable characteristics. The house that has not its own bit of land, its own possibilities in the way of garden or orchard, even if that orchard sum up as only one old apple tree, has not the right to the title "comfortable." Building associations all over the country are making building possible for even very limited incomes, and these associations are supplemented by work from our architects that gives us every form of inexpensive design, and proves that beauty and cheapness can go hand in hand.

Whitewash and Fire.

Whitewash, says the *American Analyst*, has many uses, political and moral (or immoral rather), as well as economic. But as a fire-extinguisher it has not been hitherto generally recognized here. "Do you know," said a scientific gentleman the other day, "that it is next to impossible to burn a whitewashed fence? And do you know, further, that in France, to protect the frame and interior of other buildings from fire, the walls, beams, joists and the underside of floorings are thickly coated with lime wash before they are placed in position? It is so, and if this course, which has prevailed abroad almost from time immemorial, were adopted here, it would save many a house, many a village from destruction. I do not mean to say that it will prevent the spread of a fire once under great headway, but from its uninflammable character, it is a guard against the prime ignition that often leads to dire results." This little hint set the writer to making inquiry among competent authorities, and full confirmation of the doctor's words was the outcome.

NEW PUBLICATIONS.

Improved Plumbing Appliances. By J. Pickering Putnam, Architect. Size, 9 x 6 inches: 129 pages. Published by William T. Comstock, 1887 Price, $1.50.

During the year 1886 the illustrated articles which the above work comprises appeared as a serial in our contemporary, *Building*. In the words of Mr. Putnam, until very lately the tendency in plumbing has been toward great and increasing complications and costliness, and the result is a tendency on the part of the public to do away with set plumbing as far as possible. It is stated, however, that a reaction has now begun in favor of greater simplicity in work and better and more scientific fixtures. The above book by Mr. Putnam is devoted to explaining in a simple manner "the principles of this improved modern sanitary plumbing and of the best and simplest fixtures now in use." The book is divided into 12 chapters, the first six of which treat in a general way of many important subjects. A chapter of particular interest is one on cesspools, which describes and illustrates, with the aid of cuts, the places in which filth collects in different plumbing fixtures. Chapter VII, entitled "Traps," opens with the following paragraph, which will perhaps serve better as a summary of the contents of the preceding chapters than to indicate what is contained in the remainder of the book. The sentence reads: "Having explained the principles which should govern the construction of plumbing appliances, and shown how widely they have been disregarded in practice, it remains now to point out the comparatively few cases in which they have been observed." The author then traces the evolution of the "Sanitas" trap, illustrating its different forms, and arguing at some length in support of its advantages. Lavatories are next treated in much the same manner, prominence being given to the "Sanitas" article. In the succeeding chapters, "Kitchen Sinks and Grease Traps," "Water-closets, "Simplicity *vs.* Complication," "Piping and General Arrangement of Plumbing Work," are the respective headings. The book contains altogether too much valuable imformation of broad application to warrant our calling it a trade publication, but we think it would have been a better plan if the author had seen fit to divide the work into two volumes, the one devoted to the general subject of plumbing appliances, and the other to descriptions of Sanitas specialties.

Builder's Guide and easy Estimate Blanks. By J. P. Hicks. Published by the author.

The author says in this work that the blanks have been prepared with an idea of furnishing carpenters and builders a convenient form upon which to make estimates and record the cost of the work which they execute. The blanks are of several kinds arranged in sets to receive the estimate. The first page of each set is designed for timber, and is provided with spaces for different kinds and sizes. Blank lines are left for entering similar items as may be necessary. Opposite this is a ready-reckoner scantling measure, which the author believes will be found a great help in estimating all kinds of framing timber. Following this are spaces for siding, sheeting, shingles, &c.; space is also provided for extras. In this provision is made for a record of different items of material bought or exchanged at

the lumber yard, which the author believes is of great importance to the builder, since it enables him to keep a complete record of the account between himself and the lumber merchant. A preliminary chapter in the work is entitled "How to estimate." Following this a page is devoted to ready reckoned estimates, showing the amount of lumber required for various parts of buildings. Running remarks on estimating are presented under such heads as Plastering, Painting, Window Frames, Foundations, Chimneys, &c. Under the head of Estimating Labor there is introduced what is called "Workingman's Table of Prices," which is supposed to show the average day's work in different departments of the trade, and which gives as a derivative therefrom the rate per square, per foot or per piece, as the case may be. A blank column is provided in which may be entered the correction of prices, as derived from actual experience, in a given locality. Some matter is introduced in the preliminary text which is quite irrelevant, but which evidently shows the bias of the author's mind. One of these is an extract from a Boston paper, entitled "The Wage Thermometer." Along the tube is shown different rates of wages, ranging from 32 cents per day, which is marked "Freezing Point" and "Chinese Labor," up to $5 per day. Opposite each intermediate figure are remarks relating to the condition of the workmen receiving the wages named. For example, opposite $2.50 we find the following: "Not afraid to get married. Sends children to school. Buys a newspaper pretty often. Fairly well posted, and has one or two books." The estimate blanks are ruled in red, with cross-lines printed in black. Two columns are provided throughout—one entitled "Estimated Cost" and the other "Actual Cost." It would seem that the scope of the forms restrict them to buildings of the simplest construction, with very little opportunity for extending the work to more pretentious structures.

THE AMERICAN GLOSSARY OF ARCHITECTURAL TERMS. Being a concise and comprehensive compilation of all terms used in the practice of architecture and the building trade; 8 x 11 inches; bound in cloth; gilt side title. By Geo O Garnsey, architect. Published by the author.

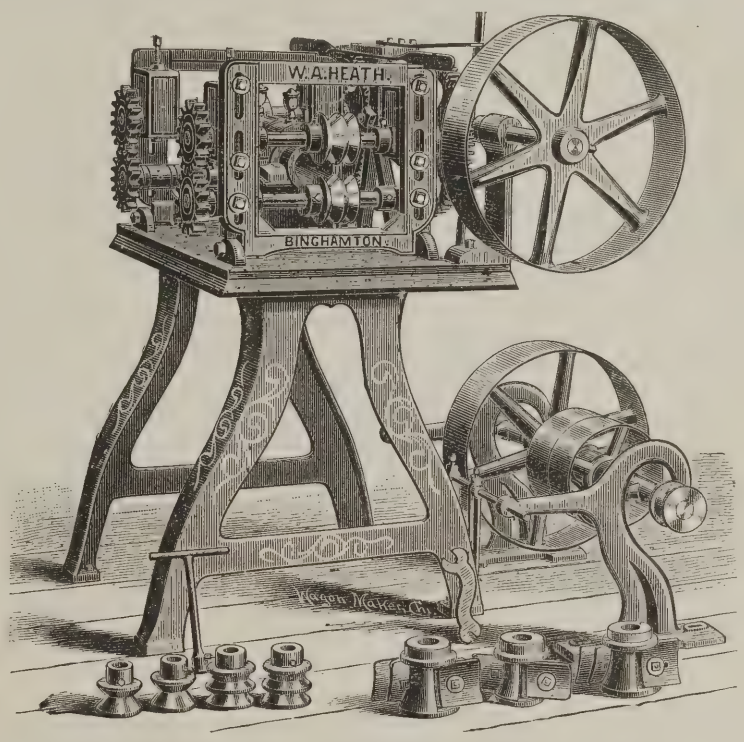
This book is the formal arrangement of a series of articles which for some time past has been running in the "National Builder," a periodical, of which the author, Mr Garnsey, is the architectural editor. The terms to be defined are arranged on right-hand pages throughout the book, while illustrations occupy the left-hand pages. The work is printed on a fair quality of paper in a reddish brown ink, which adds to its typographical appearance. The cuts are reproductions from well-known works, and happily illustrate many of the terms that are defined. The value of such a book to all students of architecture and the building trades is not to be gainsaid. The author has made an effort to bring the book down to date, and to include in it all the terms used in both America and England. While admitting the value of the work, some criticisms are demanded. The opportunity of really doing a good thing for young students has, in some respects, been neglected. One or two illustrations will suffice. On the last page for example, we encounter the term "zigzag molding," which is defined, "A characteristic molding much used in the arches of Norman buildings." Other definitions in the work are similarly inadequate. Without illustrations or further description, the reader would have difficulty in determining what the "characteristic molding" really is; either in design or manner of construction. A "jack" is defined "as a mechanical device for lifting great weights;" but there is no intimation whether it works upon the principle of the wedge, the screw, or as a simple lever. "Lead" is omitted; although sheet lead, which is defined as a "thin layer of lead used in plumbing work," is included. On the other hand, tin is very carefully defined. We quote: "Tin—a metal, equivalent 59, symbol Sn; specific gravity 7 29; fusing point 442° F." Tin plate, on the other hand, is omitted. Iron is described after the manner of tin above quoted; and there is added a sentence with reference to its history. These points are selected at random through the work, and indicate that a revised edition could be made to be more serviceable in many little matters than the present work. However, the book fills a want, and it is entitled to a prominent place in every builders' and architects' library.

THE ESSENTIALS OF PERSPECTIVE. with illustrations by the author. By L. W. Miller. Oblong, 5 x 10 inches; 100 pages; 137 engravings; bound in cloth. Published by Charles Scribner's Sons. Price $1.25.

In presenting his work to the public as the essentials of perspective, the writer certainly cannot be accused of a misnomer, as he has devoted himself to singling out the essentials and important principles and elements, and to presenting them to the reader in the most simple manner, using the plainest possible language and omitting technicalities so far as possible. In fact, he makes the reader see that something which upon presentation appeared very difficult was, in reality, very simple, if only considered from a different point of view. The manner in which the subject is treated is quite novel, and is well calculated to produce the greatest impression by the simplest means. A variety of methods for accomplishing the same result are given, which, of course, enlarges the field of usefulness of the work. The book is deserving of especial mention in the matter of its illustrations, as the author thereby demonstrating his own talent has not been content with giving the simplest diagram necessary to the elucidation of the point in question, but has treated the reader throughout the entire work with some pretty sketches, very ample drawings often being used, to illustrate a very simple point. One or two of the points treated in the chapter on curves might be considered erroneous in the light of rigid geometrical rules of perspective; but this might, perhaps, be overlooked if the reader could fall into and agree with the free manner in which the author considers it proper to treat certain objects, after having perused the chapter on Curvilinear. In this chapter Mr. Miller succeeds in introducing the reader to the perplexities arising from a comparison between what a rigid adherence to the rules of plain perspective would produce and the impression which the eye gets from rambling about from one portion of the scene to another, illustrating the same with drawings of columns and figures in the same scene, with very disparaging results. He does not, however, succeed so well in leading the reader out of the difficulties, but leaves him to adjust matters as best he can. If any conclusion reached is pre-eminent above others, it is that architectural features near the extremes of the picture should follow the rules of perspective, and that figures in these unfortunate positions should be drawn to appear as though each were directly in front of the eye, a conclusion which scarcely appears just, as it would seem that what was suitable for one was also suitable for the other.

Improved Dowel Machine.

The engraving herewith represents a new rod, pin or Dowel machine recently brought out by W. A. Heath, of Binghamton, N. Y. It is adapted for boring rolls from 1⅜ inches up to 2½ inches. It is designed especially for use with chair stock, curtain poles and other similar work. The principle upon which the machine is constructed will be understood by the following description: There are four rolls, two on each side of the arbor, made adjustable up and down, in boxes held to the frame by cap screws, with a slot in the frame. In the top box there is held a rubber spring. The form of each side of the head is made so that, by putting a long bolt through the bottom of two ears or lugs on the bed of the plate, a hinge is constructed by which either one or both of the rolls can be let down for changing the head or taking out broken sticks. The arbor is made of steel with a screw cut into it to accommodate the heads which screw in place. The bearings are of brass. The machine has three changes of feed and also a stop and reverse motion. This can be made effective while the machine is running. The entering feed rolls have square grooves to fit the rough stock to be turned, and the discharge rolls have round grooves to correspond with the turning head.



Heath's Rod, Pin and Dowel Machine.

Henry Disston & Sons, of the Keystone Saw, Tool, Steel and File Works, Philadelphia, have issued a little pamphlet entitled "The Saw: How to Use it and How to Keep it in Order." The subject matter of the text is contained in the first few pages of the pamphlet and serves as an introduction to a very general description of such saws and saw attachments as are manufactured by this well known firm. We have also received from the same establishment a companion pamphlet entitled "Specialties in Tools, Manufactured by Henry Disston & Sons." Both of these little works are of interest to all our readers.

TRADE NOTES.

WE HAVE RECEIVED from Irving Brothers, of Elwood, N. J., samples of their water-proof building paper and Japanese paper carpeting. Close examination of the samples impresses us with the idea that they are particularly strong and well adapted for the purposes for which they are intended. The Japanese paper carpeting is a close imitation in appearance of the conventional oil-cloth with which every one is familiar. It has the advantage of being much cheaper than oil cloth, and, according to the makers' circular, is more durable, while also lighter and handsomer in appearance. The water-proof building paper is a very fine specimen of material of this kind, and is infinitely superior to what is commonly employed in building construction. The company also make a prepared roofing which consists of the heavier grade of paper carefully painted for use. This roofing has the advantage of being free from tar. We understand that it is being sold very extensively in the West for such purposes as covering cattle sheds, &c.

GRYGLA & SELDEN, of Minneapolis, Minn., present their card to our readers this month, referring to galvanized iron cornice work, skylights, iron doors and shutters, corrugated siding, &c. They also mention architectural sheet-copper work and roofing, in iron, slate, tin, pitch and gravel, asphalt and metallic tile.

WE HAVE RECEIVED from W. A. Heath & Son, Binghamton, N. Y., a copy of the last edition of their catalogue of wood-working machinery. The book is in pamphlet form and accompanied by a price list. A number of new machines are shown, being additions to the very complete lines which this firm manufacture.

A VERY UNIQUE CARD has been issued by the Hersh Furnace Company, Lehighton, Pa. The subject matter of the card is an announcement of the formation of the Hersh Furnace Company, composed of William R. Butler and James N. Hersh. It also refers to the factory which has recently been erected for the accommodation of the company's business. This matter is printed upon the inside of a neatly folded card, and is arranged in a manner to simulate a clipping from a newspaper fastened in place by two wafers. The counterfeit is exceedingly interesting, and those who are not accustomed to prints of this kind would be very apt to feel for edges before being convinced that there are no edges to be found.

THE GURNEY HOT-WATER HEATER COMPANY, with head office at 237 Franklin street, Boston, have issued a very handsome four-page circular containing a general view and sectional view of the Gurney hot-water heater, with descriptive text, including a very able presentation of the advantage of heating with the hot-water apparatus. The circular is of the kind to interest architects and builders in general.

THE BANGOR VALLEY ROOFING SLATE COMPANY, Bangor, Pa., referring to slate roofs, present a statement which will be indorsed by many of our readers, to the effect that, slate roofs are not only good, but also cheap. They are fire-proof and do not rot; nor do they need painting. They are ornamental, and also clean, and are, therefore, just the thing where cistern water is used. They then refer to the special quality of the slate that they are producing, which is a dark-blue or black. They offer to make prices on slate, delivered at any point in the country.

THE NEW CATALOGUE of architectural ornaments issued by Bakewell & Mullins, of Salem, Ohio, is a handsome octavo book of 200 pages. It contains a larger assortment of designs of this line of manufacture than has ever before been published either in this country or in Europe. All the designs are engraved to scale, and in addition the dimensions of each figure are appended. The book is arranged in sections, ornaments and designs of a kind being, so far as possible, gathered together. The first and most prominent division of the book relates to sheet metal statuary, the designs of this class covering a large number of subjects. Brief descriptions accompany the illustrations, and in many instances the names of the buildings on which the work is used and the name and address of the architects under whom the work was constructed, are given. The decorations of the new Court House, at Davenport, Iowa, are conspicuous in this class. Emblematic signs, spandrels, trophies and emblems, block and coin pieces, stamped brackets and modillions, heads and faces, leaves, rosettes, scrolls, finials, &c., complete the work. A very conspicuous feature of the book is the portion devoted to capitals. This contains, probably, the most extensive assortment of designs of this kind ever put out in this country. A telegraphic cipher is presented at the close of the book, in combination with a numerical index. The book has been prepared at great expense, and, we understand, is sent to builders and architects upon application.

THE CHICAGO HEATING AND VENTILATING COMPANY, No. 205 West Madison street, Chicago, Ill., direct attention, in another part of this issue, to the special advantages of the Ordway heating and ventilating furnace, of which they are making a specialty. This device was illustrated in our columns some time since, and our readers are already somewhat familiar with it. The company announce a 36-page illustrated catalogue free to applicants.

EDWIN A. JACKSON & BROTHER present in their advertising space, in another part of this issue, a new design of the Jackson ventilating grate and fireplace furnace. They announce that over 200 different styles in design and finish of this article are now made.

M. H. JOHNSON, 140 Centre street, New York, has been appointed selling agent for the Gurney hot-water heater; The Rice & Whitacre Mfg. Co., Nos. 42 and 44 West Monroe street, Chicago, have been appointed the selling agents for the same device in that city. Architects, builders and the trade in general, we are informed, are requested to communicate with the different agents of this device located nearest to them for such information as they may desire.

J. H. HOAGUE & Co., Chicopee, Mass., are calling attention to their patent draw-knife chamferer, made to fit any size draw-knife, and which is so arranged as to make any number of chamfers exactly alike. A cut of the device appears in their advertisement on another page.

AT A RECENT MEETING of the Executive Committee of the Architectural League, of New York City, Mr. C. Powell Karr was elected a member of the organization.

THE STANDARD MACHINE WORKS, Nos. 117 to 121 North Front street, Camden, N. J., are introducing Hand's patent Planing Caps and Bits, which are adapted to be put on any planing machine They invite the trade to send for circular A, which they are issuing.

THE NEW ODD FELLOWS' HALL, at the corner of Olive and Ninth streets, St. Louis, has reached the level of the second floor. This building will be seven stories high, and, besides liberal accommodations for the various city lodges to occupy it, will have a large number of office rooms. The lower stories are faced with red granite, alternately rough and polished; the upper stories are of brick with granite trim. The construction is of the most substantial character and fire-proof throughout. Estimated cost about $750,000. Mr. Henry G. Isaacs is the architect.

A NEW circular has been issued by the United States Mineral Wool Company, illustrating the applications of mineral wool for various purposes. A modern house is shown in perspective with walls and roofs, sufficiently broken away to indicate the presence of the material as a packing between floors and ceilings, in outside and partition walls, and between the rafters of the roof. A cross-section showing the same work is likewise presented. A railway car similarly treated in the floor and in the sides is likewise illustrated. The advantages gained in both these instances are, economy of heat and deadening of sound. Other illustrations represent the application of the material to furnace pipes, doors of stoves and the coverings for steam pipes, boilers, &c. On the last page illustrations are represented showing how steam pipes, water-pipes, &c., may be carried long distances and packed in mineral wool in a way to avoid loss of heat by radiation and to escape the damage of frost in the winter time.

THE STAR HACK SAW is already well known to our readers. The frame is made of steel, polished and nickle-plated, and the saws are adapted to be instantly inserted. The Millers Falls Company, No. 93 Read street, New York, are supplying the article.

IN THE JULY number of *Carpentry and Building*, on page 132, we presented the design of a buffet by Mr. John B. Walters, of Baltimore, Md. After the paper had gone to press, and when too late to make any correction, we noticed that by an engraver's error, the side elevation did not agree in scale with the front elevation. Doubtless many of our readers have already noticed the discrepancy. We refer to the matter simply to remove from Mr. Walker the responsibility of the error. In the drawings submitted, the two views agreed in scale.

THE GLEN COVE MACHINE COMPANY, LIMITED, Nos. 28 and 30 Clay street, Brooklyn, N. Y., report business as very satisfactory at the present time. They have recently contracted with Abraham Steers, of New York City, for the outfit for his new model planing mill. Among orders recently finished may be mentioned the planing and matching machines supplied Vanderbeek & Sons, Jersey City, and machines shipped to Knapp, Stout & Co., Fort Madison, Iowa. They have also shipped machinery to the Lafayette Car Works, Lafayette, Ind.; also to the car works at Lima, Ohio; the Pullman Palace Car Company, Pullman, Ill., and T. Wilce & Co., of Chicago. Machinery has also been shipped to the Ludington, Wells & Van Shaick Lumber Company and the Kirby Carpenter Company, of Menominee, Mich. Among foreign orders filled recently was a shipment to Chili, South America. We understand that the company have a full order book at the present time.

THE MOSELEY IRON BRIDGE AND ROOF COMPANY, No. 5 Dey street, New York, refer in another column to their corrugated and crimped iron roofing, clap boarding and siding. The demand for metal trimmings of this general character for building purposes is steadily increasing.

THE EGAN COMPANY, of Cincinnati, are introducing a cement for putting rubbers on band saw wheels; they have given it the trade-mark "Acme." We understand that it is put in paint cans fitted with nozzles and sold at a very reasonable price. The claim is made that the cost of an entire can of this material is saved in the first using. At the same time a single can will last, under ordinary circumstances, more than a year.

E. C. STEARNS & Co., of Syracuse, N. Y., manufacturers of Hardware specialties, are directing attention to a door clamp, entirely new in design and a radical departure from the old style Iron clamp; also to a new register and ventilator, and to their silent saw vise.

THE SCOTT AND MILLER PAPER COMPANY, of Philadelphia, announce a removal to 611 Commerce street. The goods produced by this company have an enviable reputation among builders, and in the new quarters of the company a very fine display will be made.

W. H. ROYSTONE, Galveston, Texas, is offering shop rights for the manufacture of carbonized wood ornamentation. Work of this kind has attracted considerable attention wherever introduced, and the patentee offers samples and particulars, upon conditions explained in his advertisement.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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VOLUME IX. NEW YORK, SEPTEMBER, 1887. NUMBER 9

NOTES AND COMMENTS.

THE Master Builders' Exchange, of Philadelphia, although a comparatively young institution, has gone to work in its chosen field in a way that promises the best results for the future. Among other new enterprises in which it is at present engaged may be mentioned the purchase of an important piece of property in the business center of Philadelphia, which is to be fitted up in excellent style for office purposes, reserving a certain portion of the building for the accommodation of the organization. We understand, further, that a national bank, the stock of which is to be owned exclusively by members of the association, is likewise in contemplation. In each of these enterprises the co operative spirit prevails, and the idea is that the builders of Philadelphia control enough business and handle enough money to make, for example, the banking scheme a remunerative one not only to the stockholders, but also of advantage to the members of the organization in special accommodations which could be obtained through it, if properly managed. As one result of the efforts of this organization, it may be remarked that Philadelphia the present year has been practically without strikes, that the building trade is prosperous, and, while prices are not high, every one has all that he can do. At the same time, labor is paid fully up to the average of other cities.

PHILADELPHIA expects to make a very important industrial, civic and military display during the three days in September which are to be devoted to the centennial celebration of the adoption of the Constitution. Different organizations are making very extensive preparations for taking part in the display, and manufacturing establishments are likewise busy in devising special means for illustrating and advertising the industries which they represent. Liberal appropriations have been made, not only by the State of Pennsylvania, but also by some of the adjacent States, for defraying the expenses of troops and societies which propose to attend on the occasion named. Prominent in the display will be the Master Builders' Exchange, the members of which are at present making elaborate preparations, in order to show the importance of the building industries and emphasize the influence of this organization.

IT IS evident that the Master Builders' Association of Boston are an enterprising and prosperous organization. They have taken leading place in the discussion of matters of general interest to builders in all that has been done in many months past, and, if we mistake not, were primarily responsible for the formation of the National Association, an account of which appeared in our columns a few months since. They have recently bought a handsome building in Boston for the use of the association. The building is Nos. 164 to 170 Devonshire street, and for it the association have paid $250,000. The building as it stands is a four-story granite structure, but improvements are to be made upon it. It is proposed to add two or three stories to its hight as soon as the leases now existing expire and to overhaul it generally, so as to make a first-class office building. Of course the association will reserve ample accommodations for their own purpose. The property in question adjoins the Equitable Life Insurance Building and runs through from Devonshire street to Federal street, and covers about 6500 square feet.

THE building papers credit Pittsburgh with a building boom. Building has been somewhat active in Pittsburgh and vicinity for some time past, and is the natural sequence of the industrial activity growing out of the employment of natural gas. We understand that building permits are being taken out in Pittsburgh to the amount of over $100,000 per week. Of 27 reported in the list of permits for a week a short time since two were for buildings of large size. The largest single class represented was that of suburban dwellings. One conclusion to be drawn from the building statistics of Pittsburgh at the present time is that much of the building that is in progress is due to the increased demand from the laboring population of the place. A large number of small dwellings are in progress. The disastrous fire on Fifth avenue, Pittsburgh, which occurred since the above was written, will still further increase the building demand. The Masonic Temple, we learn, is to be rebuilt at a cost of $500,000, while the other buildings are also to be rebuilt in a superior style.

MANY years ago, when Massachusetts was a colony and Boston was a village, the importation of brick from Great Britain was a somewhat common occurrence. We have illustrated in the past one or two houses built in whole or in part of imported brick, and which represented the state of the masons' art in the last century. With the development of brick manufacture and industries in general in this country, it was to be supposed that the importation of brick would stop; but rom recent accounts which have reached it would seem that the trade is reviving of late. A special dispatch from Boston, dated somewhere near the middle of July, mentioned that 155 000 so called "Gladstone" brick were to be used in the construction of a part of the new courthouse. These bricks are from the kilns of W. E. Gladstone & Son, Hawarden, Wales. A peculiarity of the brick is that they are several times larger than ordinary American brick, and weigh proportionately more. The dimensions of these bricks are said to be 9 x 4⅜ x 4¾ inches. On both the top and bottom they are grooved or indented, 6¾ inches long by 1¾ inches wide and 1 inch in depth. As the brick are laid these grooves are closely filled in with mortar, which gives added firmness to the wall. The brick are of a light buff color, and in this particular case are to be used to face two large interior courts of the building, where they will reflect the light, or, more correctly speaking, fail to absorb it. The price of the brick delivered has been reported as $45.50 per thousand. The English brick in this case are being preferred to the Milwaukee brick, which are of the same color, on account of superior quality. The imported brick are warranted never to change in any manner, except to grow slightly darker. In the making of these bricks, it is said, that 30 days are required. Referring to the courthouse above-mentioned, it is interesting to add that imported beams are also being used in its construction. These beams come from Antwerp, and are used simply because they cost less than the American product.

AN item has been going the rounds of the foreign press which contains a suggestion that may prove of value to some of our readers provided they do not forget it before next winter. The note describes a method of thawing frozen earth when it becomes necessary to dig up water-pipes or anything under ground during cold weather. The agent proposed for thawing the earth is unslaked lime. The lime is first spread over the ground at the spot to be excavated and then covered with a layer of snow; a second layer of lime is then added and snow over it, after which the mixture is left to act for 12 hours or more, when the ground beneath will be found soft. If the frost is very deep a greater number of the alternate layers will be required, though no definite rule is given in this regard. In the absence of snow water must be used to slake the lime, and the whole must be covered over with sand or some non-conductor to prevent the too great loss of heat. The principal objection to this method is the slowness of its operation, and this, of course, would preclude its use in many instances. As a substitute for the bonfire the lime method of thawing presents many advantages. It is so simple, however, that we cannot believe that it has been only recently applied. In the Northwest especially, where the long and severe winters bring many occasions for excavating, we should think that the heat given off by slaking lime would have been used before this for thawing out the earth.

ONE of the features of the modern business world is the rapid multiplication of insurance companies. Formerly, protection could only be had against fire, but now policies may be obtained guarding the insurer against loss from almost any cause. Plate glass is insured, steam boilers are insured, and title guarantee companies are insuring the buyer of real estate against losses dne to defective titles. One of the latest developments of the general plan of insurance has taken place in Copenhagen, where a company has been in operation about a year, the object of which is to guarantee against loss by imperfections in gas and water pipes. According to the account of the company, published in an exchange, both valves and pipes are insured, mainly against damage or damaging by freezing.

lnjury to ceilings, frescoes, paintings, or furniture are included, when such happens from water-pipes alone, through their freezing, &c. There are provisions in the policy that the insured must take care that when water-pipes are not in use the outer or street valve be closed, and all water drawn from the house pipes. If the latter are especially exposed to cold, the policy states at what degree of temperature the water must be shut off. The premium for insurance against damage of decorations and furniture, including water-pipes, is from 0.25 to 0.33 per cent. of the amount of insurance. Considering the comparative rarity of losses incurred by bursted water-pipes, the above premium seems an exorbitant rate to pay. Competition between several companies would probably result in much lower charges. It is doubtful if such an insurance company would do any very large business in this country, though if the premiums could be made small enough there are many householders who would like to protect themselves against damage by water.

THE soil on which the city of Chicago rests is of the most treacherous kind, considered from a builder's standpoint. The place where Chicago stands was 50 years ago a mere swamp, and swamps, ordinarily, are not selected as building sites. Nevertheless, the city was started, and has gone forward until at present it contains some of the largest and finest buildings that have been erected anywhere in the country. With such a soil it is not strange that difficulties are encountered in laying the foundations of buildings, and, in turn, with the buildings themselves after they are put up. It is hard to secure a good foundation, and even where the best is obtained that it is possible to get, buildings sometimes show evidence of settling, and it is not uncommon for the walls to crack and for other symptoms of disintegration to appear, necessitating very costly repairs. A case in point is the Post Office Building, which at present is being tied up like a bundle to keep the walls from bulging outward to an extent to render the building unsafe. A firm has bid $24,000 for the repairs, and at the present writing the scaffolding preliminary to the work has been erected. The general plan is to extend rods through the building, with nuts and washers at their ends, so as to hold the building together. The trouble in this case is aggravated by the fact that the building itself is composed of poor material, and in settling it has progressed very irregularly. Some places it has settled to an extent of 6 or 7 inches, while in others the foundations have remained practically unmoved. Fifty thousand feet of lumber have been used for erecting the scaffolding for the repairs. These scaffolds carry the drills, by which holes will be bored through the building. Rods are to be extended through under the cornices, and through the first, second and third stories. Over 200 holes 2¼ inches in diameter will be bored, and some of the rods will be as long as 300 feet. Thirty-five rods will be used on each floor, and altogether some 25 tons of iron will be employed. We suppose the moral of all this is that building should be more carefully done, and that greater care with regard to the foundations in this case would have saved the item of expense to which the Government is subjected at the present time. With the Chicago City Hall shorn of its cornices and belt courses because the stone was so poor that it got into the habit of dropping down on the heads of pedestrians, and with the Government building propped and tied up in the style above mentioned, it would look as though a change would have to be brought about before long in order to enable the "Lake City" to retain its prestige in building matters.

OUTRAGEOUS treatment of non-union men is reported at the hands of the Chicago Bricklayers' Union, which, it will be remembered, secured such important concessions as the result of the recent arbitration of the building trades troubles in that city. The workmen who stood by the builders during the strike were abandoned to their fate when the strike ended by every builder but one, and he has experienced much trouble as a consequence of his honorable conduct toward the few who remained faithful to him. The bricklayers who forsook the union, and are now endeavoring to secure their restoration to membership on account of the renewed ascendancy of the bricklayers' union, have been fined as high as $500 if they are suspected of owning any property. Some of the non-union men also have been violently ejected from the hall of the union, to which they had gone to plead for admission to the organization. Serious injury was inflicted in several cases. The master masons' association in all honor should protect these poor men. If they can do nothing else, they should at least pay their fines. They accepted the humiliating terms of the arbitration, and should pay the indemnity demanded by the victorious union. The carpenters' strike for eight hours and 35 cents an hour, inaugurated on the 26th ult., causes occasional inconvenience, but not widespread trouble, although there are indications that the bricklayers will forswear their settlement with the master masons' association, take the disaffected carpenters under their powerful protection, and demand that the terms asked shall be conceded under penalty of another strike. Under the circumstances the condition of the Chicago building trades is not reassuring.

THERE was printed in a late number of the *American Machinist* a letter from the Gage Tool Company, of Vineland, N. J., containing some interesting particulars of spontaneous fires. Their attention was first drawn to the subject of spontaneous combustion in 1883 by noticing the alarming increase in temperature that took place when the sweepings from the floor of the factory were collected in heaps. On this occasion the floor had been sprinkled and the moist sweepings left in a pile. The same day a thermometer placed in the mass after it had been disturbed indicated a temperature of about 200° F. On another occasion the next year, a peculiar odor being noticed in the factory, it was found to proceed from a barrel of shavings and chips from the boring and mortising machines, which were saturated with warm linseed oil. When the cover was removed from the barrel the fumes were quite strong, and the shavings were so hot that the hand could not be held in them. Various other similar instances were recorded in the letter, one of which was especially interesting. The shavings made in planing oiled stocks were collected in a barrel, and, water having been spilt on them, it was found that they soon began to heat. The temperature continued to rise until the afternoon of the succeeding day, when the shavings near the top of the barrel commenced to char. The barrel was then placed out of doors and covered with a metal plate. The next morning, on removing the plate, it was discovered that the shavings were charred, and had shrunk some 3 inches away from the sides of the barrel into a cylindrical mass, which when disturbed burst into flames. The experience of the Gage Tool Company might be paralelled by numberless other instances were any evidence needed to prove that spontaneous combustion is a phenomenon of common occurrence and one fraught with the gravest danger. The conflagrations arising from this cause are less now in proportion than formerly, when people were skeptical of the whole matter. There is yet, however, altogether too large an amount of property annually destroyed by fire originating in this way, and which a little care would have prevented. Too much emphasis cannot be laid upon the danger of allowing greasy rags, shavings and other combustible materials to remain collected where their ignition would set fire to buildings. In workshops and factories it is a simple matter to have all greasy wastes removed to a place of safety each day, and after such a rule has been strictly enforced for a while it will be afterward lived up to by the workmen through habit.

THE wooden statue of "Justice" that until lately surmounted the tower of the New York City Hall has been in an insecure condition for some months past, but it is only quite recently that steps have been taken to remedy the trouble. The statue was taken down a short time since and was found to measure 10 feet 6 inches in hight. After being removed the question of supplying its place came up for consideration. The attention of the officials in charge was called to the fact that it might be replaced in wood, or in bronze, in copper or in zinc. It was estimated that to make a model from which fine castings in any metal could be made would cost $2000, while the additional cost of casting would depend on the material used and the workmanship required. It would seem from the figures submitted that nothing but cast metal was considered. Copper, it was estimated, would be cheapest, and a figure in it would weigh about 700 pounds. A statue of copper, made with good workmanship, was estimated to be worth $5500; a bronze statue was estimated, according to a newspaper report, at twice that sum, with a weight considerably in excess of copper; a zinc statue, on the other hand, was estimated to be between copper and bronze in the way of cost. These figures, no doubt, will look exceedingly high to many of our readers, especially to those who are informed of the relatively low price at which sheet-metal statues are being supplied to many of the public buildings in the West. Cast metal has its friends, and there are many strong arguments to be named in its favor. On the other hand, sheet metal at the present time is a strong rival of cast metal, so far as beauty of form and correct outline is concerned, and has the advantage of being very much cheaper in first cost and very much lighter in weight.

THE PLATES.

All of the plates published in the present number are referred to in special articles in different parts of the paper; accordingly, in this connection, we simply enumerate the subjects.

Plate XXXIII contains front and side elevations and details of a sideboard.

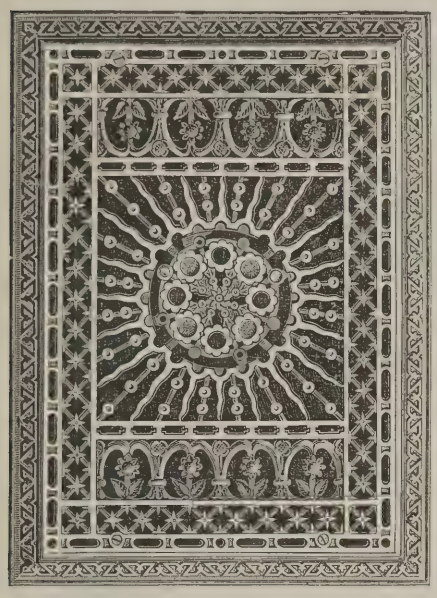
Plate XXXIV presents a view of the house forming a part of the American Exhibition now in progress at London, England.

Plate XXXV contains plan, elevation, section and perspective view of a combined summer and tool house.

Plate XXXVI illustrates a recent application of glazed brick, being a view in the engine-room of the new factory of J. & P. Coates, at Paisley, England.

The Shingle House at the American Exhibition.

Those of our readers who have followed the daily papers with any degree of care the last few months are aware that an American Exhibition has been in progress in London, at West Kensington, from the numerous references to Buffalo Bill's unique display, if not



New Patterns of Registers.—Fig. 1.—Flamboyant.

for the reason that there are other American ideas shown at the exhibition in question. But, after all, these other things do not seem to attract as much attention as the Indian and the cowboys which the Hon. Mr. Cody has taken across the Atlantic for show purposes. A recent issue of the *Building News* contains an illustration of a full size two-story shingle house of American design and execution, which is said to form a conspicuous part of the exhibit. Enough interest centers in American architecture, we think, to warrant a reproduction of the plate in this connection; and therefore we devote one page to it, Plate XXXIV. Our exchange says that the house is very picturesque, and of pleasing design and appearance, and continues:

Fig. 2.—Rennaissance.

"In America great numbers of these houses are in vogue, where at the principal watering places and summer resorts whole colonies of them are constantly being erected. No two designs being alike, the monotony usually observed in places of a similar description in this and other countries is entirely avoided. Individual taste may be readily satisfied, both as to internal and external details, with the greatest ease. They are adapted for any climate, and the mode of construction renders them warmer in winter and cooler in summer than ordinary brick houses. (We may remark, in passing, that this has been well exemplified in the house in question during the hot summer we are now experiencing.) The buildings are prepared and fitted together in Canada and America, and, as only the best Canadian white pine is used, this may be regarded as a guarantee of their longevity. Climatic influences have little or no effect whatever; indeed, they are improved externally in appearance by weathering. The house illustrated has been designed and erected by Messrs. Stent & Co., of New York, and 18 Parliament street; at the American Exhibition, Earl's court, and we believe that company have already secured important orders for these houses, and are in a position to execute contracts on the shortest notice. We shall welcome the erection of many such houses at the seaside, for instance, and in country districts where the dull, unending, staring white plaster and stucco do much to ruin the natural beauty of the scene."

From the last remark above it would seem that there is a possibility of American ideas in the construction of detached and suburban houses being introduced into Great Britain. Referring to the plate, there are some things against which disclaimers should be entered. We repudiate the figures, both those in the foreground and those near the entrance door. They are not American. It is to be distinctly understood that they do not form a part of the exhibition, but, rather, are some of our English cousins enjoying the beautiful landscape, of which the American house forms a part. We also repudiate the female who has made her way to the piazza on the second floor, and who is industriously flirting with some one concealed among the trees at the left of the house. Such things of course are entirely un-American, and are only incidents of the exhibition and not a part of the display.

New Patterns of Registers.

The Tuttle & Bailey Mfg. Company, No. 83 Beekman street, New York, and 64 Union street, Boston, have recently brought out a large number of new patterns of warm-air registers, ventilators, &c. We have thought it would interest our readers if a few were grouped together, by which the different designs could be compared in a way to show the actual quality of the new patterns compared with the conventional styles which have long been in use. To that end we present the cuts which are arranged upon this page. There is very little to be said about the goods shown beyond asserting that in their construction they employ the well known devices for which this company are noted. Some of the styles are made in all sizes, while others are made in only a few of the leading dimensions. Different styles of finish are supplied, according to the demands of the trade. The catalogue before us shows registers made in brass and bronze metal, gilt bronze, nickel plate, copper plate and in imitation of silver and brass. White porcelain enameled goods are also included. Referring to the designs, Fig. 1 shows what the makers have styled the Flamboyant pattern. In its features it is in keeping with the fashions of art and architectural work of the day. Fig. 2 represents a Renaissance pattern, in which flowers, scrolls, leaves, and bars are happily combined to form a design at once pleasing to the eye and yet of a character to afford ample strength. Fig. 3 represents what has been called the "Persian" pattern. Fig. 4 is described as "Indian Lattice" work, while Fig. 5 is Japanese in the character of the design. The catalogue issued by the Tuttle & Bailey Mfg. Company includes

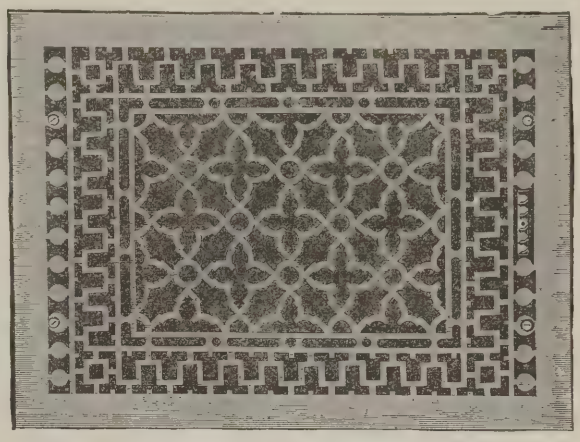


Fig. 3.—Persian.

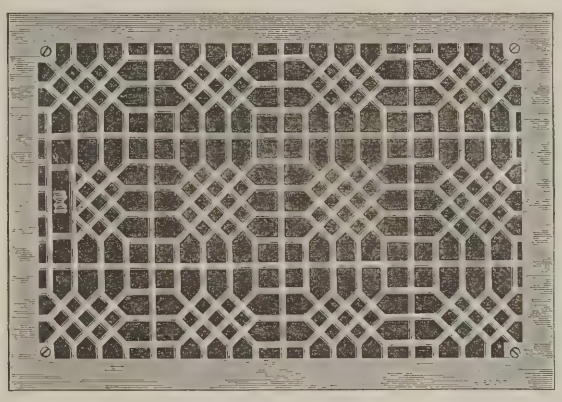


Fig. 4.—Indian Lattice.

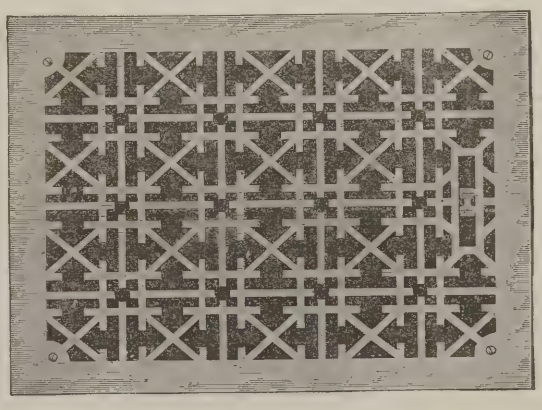


Fig. 5.—Japanese.

other new patterns not here shown, including a list of specialties, among which are dampers, pedestals, chandeliers, ventilators, &c.

Frame Dwelling.

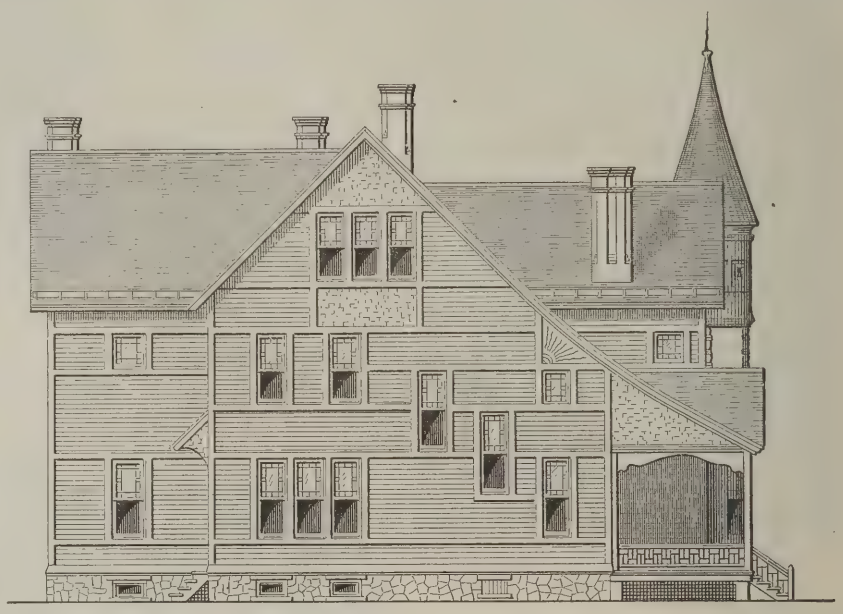
We lay before our readers this month, elevation, floor plans, and details of a frame dwelling designed by Harry Lum, 410 Rich street, Columbus, Ohio. According to the author's estimate, the building, at present prices, can be erected for something less than $5000. The elevations and plans are presented to a scale of $\frac{1}{16}$ inch to a foot, while the details are to larger scale. The building, it will be noticed, is in a style that is much affected at the present time by different designers, and has a broad sloping roof to the front, broken up by a gable, and emphasized by a tower with sugar loaf top The left side elevations has windows at different hights, which open into the staircase, thus contributing light to that part of the house. The opposite side elevation is of the conventional order, panels being introduced in the place of windows to break up some of the monotony that would occur if plain clap-boarding were employed. Four chimneys serve as adjuncts to the heating and ventilating system of the building. An attic story is provided in addition to the

House Designed by Harry Lum.—Front Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.

principal floors. According to the author's specification, the cellar is to be excavated to a depth of 7 feet, as shown in the foundation plan. The foundation walls are of rubble stone, laid in random courses. The chimneys are topped out with 3-inch flagstone, and the caps and sills to the basement windows are of sandstone. The fireplaces, chimneys, smoke and hot air flues are of hard burned common brick. Selected brick are used for the portions of the chimneys extending above the roof. The frame of the house is intended to be of second grade white or yellow pine of the following sizes: Sills, 4 x 6 inches outside frame, and inside partitions, 2 x 4 inches, spaced 16 inches between centers; first and second floor joists, 2 x 10 inches, spaced 16 inches between centers, and attic joists, 2 x 8 inches similarly spaced. The rafters, 2 x 6 inches, spaced 2 feet between centers, and the wall plates 4 x 4 inches. The roof is covered with sawed white pine shingles, of the best grade. The valleys and gutters are to be of IC tin and galvanized iron hip and ridge rolls are to be used in making the roof finish. The conductor pipes are to be of galvanized iron, square in shape. The tower is surmounted by a galvanized iron finial. The plumbing specification includes bath-tub, wash bowl and water-closet located in bathroom, a sink in the kitchen and the usual hot-water boiler. A tank in the attic is provided of 20 barrels capacity. A pump is located in the kitchen for filling it. The specification also provides for piping the house for gas. A furnace is specified with necessary pipes, register, &c Other features of construction and detail will be gained from the accompanying engravings.

A Sideboard, and How to Make It.

As an interesting variation on the furniture articles which we have been publishing in this journal for some months past, we present in Plate XXXIII a somewhat ambitious design of a Renaissance sideboard, with details of construction and ornamentation. The design was prepared by a gentleman well acquainted with the cabinet trade, and the directions which he presents for constructing the piece of furniture will be followed with interest by many of our readers. At the outset the writer directs attention to the fact that for many years sideboards



Left Side Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.

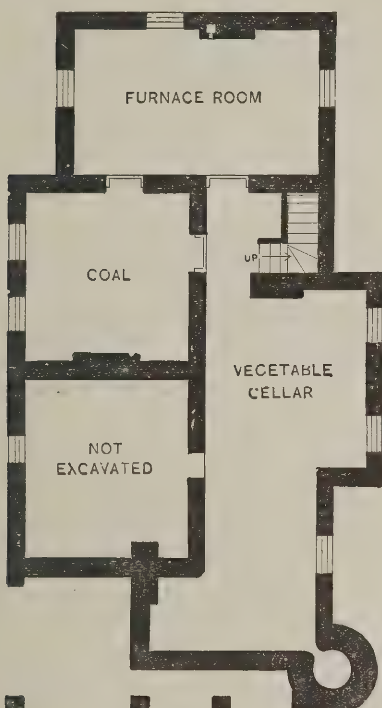
of art cabinet work with a view to its soundest and most profitable construction, it is necessary at the outset to dissect, in a manner, the ornamental and the useful—or rather the indispensable portions and the unnecessary — that is, speaking from a cabinet-maker's point of view. And doing so, the question of the method of construction which it may be best to adopt is very much simplified, and the bare skeleton, so

Right Side Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.

re constructed devoid of backs. At present the back of the article is built complete and divided into shelves and panels, thus imoroving the construction of the sideboard in a very important particular. The use of a large mirror has given place to small panels, and there is no reason why cupboards should not take the place of the upper part of the mirror, since the sideboard rises higher than it is possible to reflect the "human face divine." Construction of this kind adds dignity to the appearance of the sideboard, and offers accommodation for the handsome dinner service or plate which have to be put away somewhere in every well-to-do household. Cupboard room in the dining room is always too limited, and a range of cupboards with transparent doors is welcomed by housewives generally, who desire to keep their treasures on view, and, at the same time, have a handy place wherein to store them. These ideas predominate the design which is here presented. In examining the design of this specimen to speak, of necessary framework, may easily be discerned beneath its outer clothing of ornamentation. Of course it is absolutely necessary to proceed in this manner in the case of every piece of work that may have to be manufactured, for, once having divested the article of its secondary qualities, the question of construction is vastly simplified, and in the present case the matter is brought down to a very ordinary level.

The sideboard stands on a deep, heavily molded plinth, enriched on the upper face

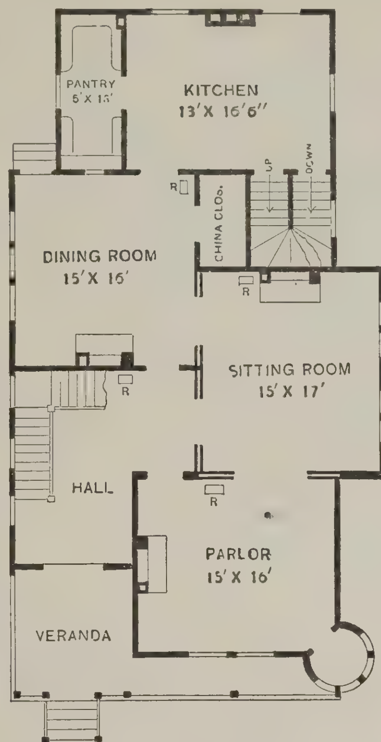
by a beaded molding of a bold character. The cupboard doors are framed up with molded stiles and carved panels, as shown in the sketch. The ends, which are framed and paneled to match the doors in front, are finished off by heavy pilasters, carved and molded on the face. The stage or upper framing which covers or finishes off this lower carcase, and which carries the top, contains three drawers—two short and one long. These are shaped on the front to correspond with the molding of the ends, the corners being decorated by a carved leaf. The smaller mold immediately below the top is broken and mitered round the pilasters in front. The top itself might be got out of solid wood, or jointed up to the required width, provided it be really dry and well seasoned. If any doubts whatever were entertained upon this score, it should be framed up in panels, with stiles and rails about 4 or 5 inches wide, out of 1¼-inch or perhaps even 1½-inch material, filled in between with ¾-inch or 1-inch panels, as the



House Designed by Harry Lum.—Foundation Plan.—Scale, 1/16 Inch to the Foot.

case might be, these being grooved into the framing. If this be done in a workmanlike manner the top will be as sound and durable as possible, and will stand all ordinary wear and tear for years. Besides this, if the panels are selected out of some nice richly-figured stuff, the contrast between them and the framing will be very marked, and will add in no small degree to the appearance of the work. This plan ought to be more generally adopted. It involves some extra amount of labor in constructing the panels, but it makes a far better and more trustworthy job; in addition to which it economizes the timber, as pieces of much smaller dimensions may be utilized for its making, thus doing away with the necessity of cutting into large boards for certain particular widths, this course very often entailing a large amount of waste material, which, if not actually useless, is at all events not so well suited for general use, as would be the case were the lengths not curtailed in such a manner, and if the calculation were made it would be found that there is actually less material in the framed top than there is in the same top, if it is solid, as, of course, much of the former would be only ¾-inch thick, while the latter would be 1¼ inches perhaps throughout.

The framing of the doors in this lower carcase does not show in the ordinary manner, as the molding on the face of both stiles and rails is mitered, being planted over the framing proper, as will be more fully explained below. The cupboards should be fitted up to suit the customer's requirements, wine drawers, revolving cellarettes, and shelves being introduced at discretion, these inside fittings being of cedar or bay-



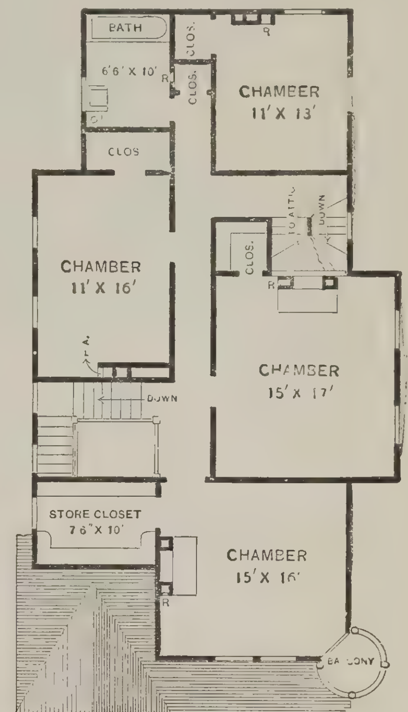
First Floor Plan.—Scale, 1/16 Inch to the Foot.

wood, whatever may be the material cut of which the whole job is to be made. The back for the lower portion must be made in three panels, and the center one, being seen from the front, should match in its moldings the front doors, but the carving need

Attic Plan.—Scale, 1/16 Inch to the Foot.

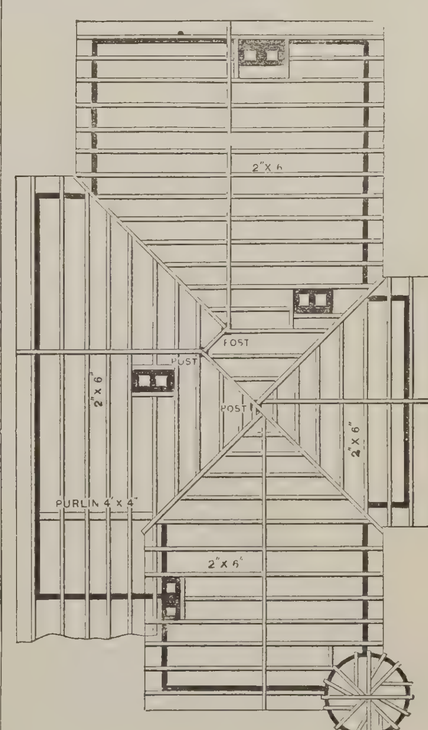
not be inserted. The backs for the cupboards must either be made ⅝ inch thick, a plain panel, or they could be constructed with panels and "muntains." In any case, as they are quite out of sight, they might very well be of common pine or whitewood, stained to match the rest of the work.

The upper half of the sideboard, the back, consists of a long cupboard, which carries the cornice, this latter being decorated by a molded or carved band, similar to the plinth. This is supported in front by three heavy thurmed pillars, richly carved and fluted, and at the back by the back framing itself, which is broken up into several panels fitted with beveled silvered plate. The upper half of the sideboard is considerably shorter than the lower, the ends being filled up by a shaped bracket which extends along the



Second Floor Plan.—Scale, 1/16 Inch to the Foot.

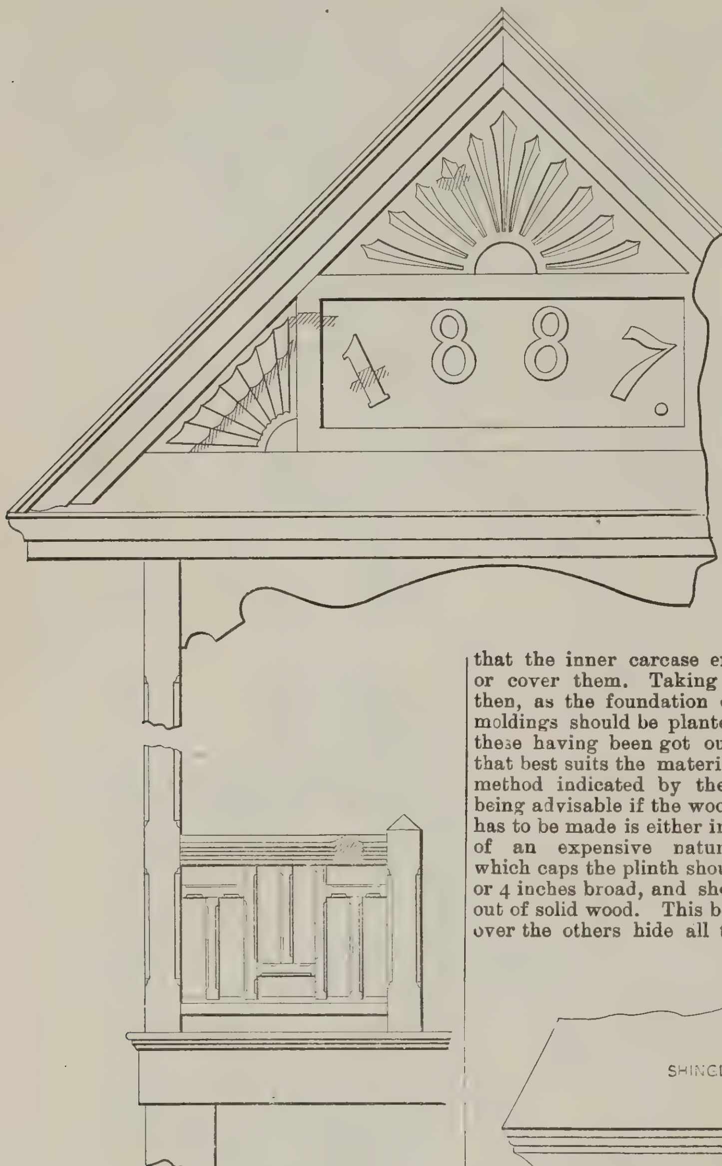
back to the full length of the top and runs off immediately below the cupboard above. A narrow shelf is placed between the top and the underside of the cupboard, shaped away at both ends and supported by a couple of brackets, carved and shaped to match the



Roof Framing.—Scale, 1/16 Inch to the Foot.

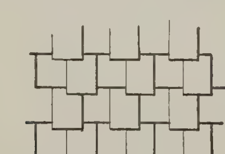
corresponding portion of the end brackets. The spaces between the back and the square pillars at the end, and the corners corresponding to these in front, are filled in with fret-cut spandrils and brackets respectively. The doors covering in this upper cupboard

are decorated on the framing by deeply-cut flutes and carved leaves, and are further embellished by having an inner framework built up by an astragal molding, the smaller



House Designed by Harry Lum.—Detail of Front Porch.—Scale, 3/8 Inch to the Foot.

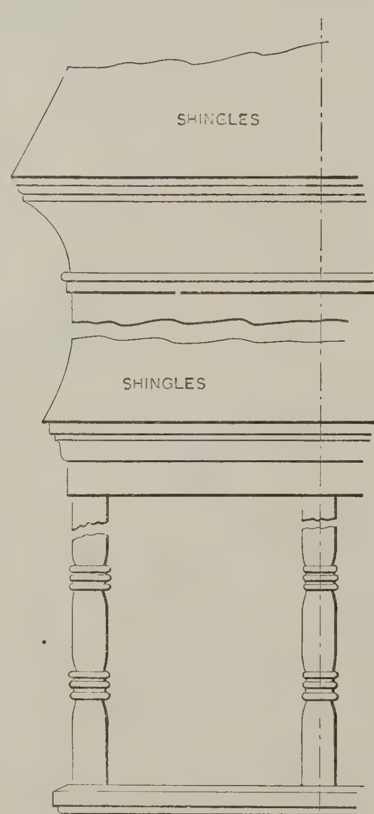
panels thus formed being filled in with transparent glass. The ends are framed in a similar manner. The two outside doors in front are in reality not doors, being fixed in their places, the middle ones only being constructed to open, this being a simpler method of arranging the front than if all were made



Pattern of Shingles on Side and Front.

to open. A recess is thus formed at either end, which, however, would be no objection, as any objects placed inside could very easily be reached from the inner doors.

In setting out the working drawing for this sideboard we think it would be best to arrange for the construction of the lower part in four pieces, these being respectively the plinth, the two carcases and the top framing or stage containing the drawers. Taking the building up of the plinth first, we would advise the workman to dovetail a pine frame together out of 1¼-inch stuff, making it almost the whole depth of the plinth, as shown in Fig. 3. It should be strengthened by having two, or perhaps three cross-rails, dovetail grooved between the back and front, these being placed in such a manner that the inner carcase ends will rest upon or cover them. Taking this framework, then, as the foundation of the plinth, the moldings should be planted on in succession, these having been got out in the manner that best suits the material at disposal, the method indicated by the section, Fig. 3, being advisable if the wood of which the job has to be made is either in small pieces or is of an expensive nature. The molding which caps the plinth should be cut about 3 or 4 inches broad, and should be, of course, out of solid wood. This being mitered round over the others hide all the joints, and, in



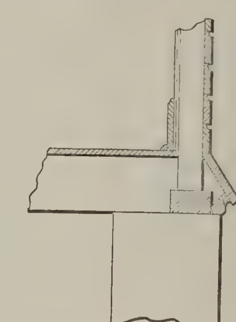
Detail of Balcony.—Scale, 3/8 Inch to the Foot.

addition, provides a very suitable ledge or projector upon which the carcase may stand, and by the means of which it may be screwed to it. The lowest member of this plinth molding, and that forming the bottom square, might be got out of pine and faced with hard wood, if the wood be, as we said before, a costly one; for only the face is seen, the top edge being covered by the molding which follows.

The doors should be made out of a ¾-inch thick, mortised and tenoned together in the usual way. The molding, which forms the front, should then be stuck in a length the

Front Gable —Scale, 3/8 Inch to the Foot.

full width required, and mitered round above this frame, projecting about half an inch over the back frame on the inner edge, to form a rebate for the reception of the carved panel. The carcase ends are constructed in the same way, Fig. 4, giving a section of these frames and showing how the arrangement is made. The top stage should be built up



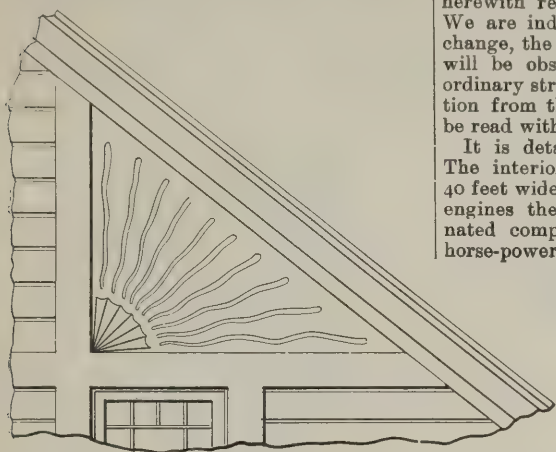
Section through Water Table.

on a pine frame, much in the same way as the plinth is done, except that bearers or foredges, as some call them—should be substituted for the deep rail in front. The necessary moldings and slips might then be planted on round this, as shown by Fig. 7. Fig. 6 indicates the manner in which the top should be framed and paneled.

The square pillars supporting the upper cupboard will have to be thurmed out of the solid wood, although this will mean a lot of waste. But it cannot very well be otherwise; it would not do to have any joints showing. The projecting moldings cannot be mitered round these pillars, either, as the grain running in the opposite way would show up very strongly when polished. The fret-cut brackets should be cut out of strong stuff, say ¾-inch, finished. The shelf forming the bottom of the upper cupboard should be built up as indicated by Fig. 8, as it would take up too much stuff to make it out of solid wood, and would not stand so well, even if made so. Two thin shelves, with a molding between about 3 inches wide and thick enough to make the whole up to the requisite strength, would serve the purpose just as well. The end frames and the two fixed frames in front might then be doweled between this and the under side of the cornice. Fig. 5 shows the method which should be used in this case, as was used in building up the plinth. The top should be boxed or covered in by means of a ⅝-inch or ½-inch pine top, as this keeps the dust from accumulating inside, and also gives a better finish to the production.

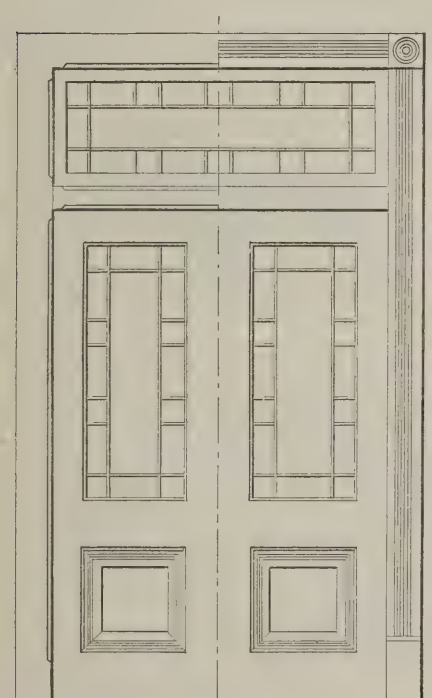
Elaborate Glazed Brickwork.

In Plate XXXVI this month we present a view of the engine-room in the new mill at Paisley, England, recently erected for Messrs.



House Designed by Harry Lum.—Side Gable Over Porch.—Scale, ⅜ Inch to the Foot.

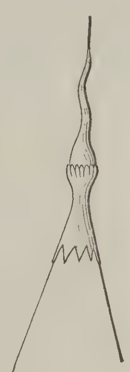
J. & P. Coates, the well-known thread manufacturers. The new buildings which have recently been erected, supplement works which have been carried on, successfully, for more than a century. They mark a distinct development, not only in the production of thread and sewing cotton, but in the erection of premises and machines to produce the same. The mills just com-



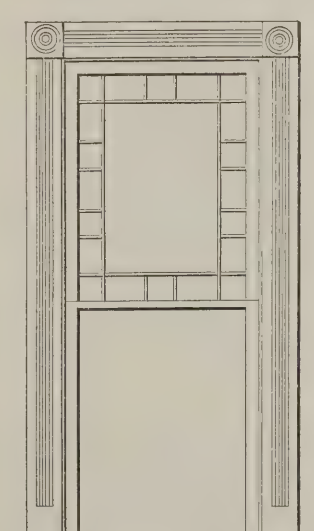
Outside and Inside Front Doors.—Scale, ⅜ Inch to the Foot.

pleted are described as probably the finest existing in the world, and neither thought nor expense has been spared in making them perfect and complete. The mill is 400 feet long by 135 feet wide. It contains five floors, and is about 150 feet in hight. The mill is lined throughout with glazed brick, a dado of brown running through each room to a hight of about 5 feet. The floors are made in the best form of fire-proof construction, being formed of wrought-iron girders, and laid in cement concrete. Over this are laid ordinary floors, which, in turn, are covered with floors of ½-inch maple boards. The iron beams are cased with perforated sheet metal and plastered. The columns are all encased in wire lathing and plastered. The cleanliness, lightness and general air of brightness and cheerfulness thus obtained is noteworthy, and forms a distinguishing feature of the salient points that the proprietors have had in view in their method of construction. The illustration presented herewith relates to the engine house only. We are indebted to our Transatlantic exchange, the *Architect*, for the original. It will be observed that the building is no ordinary structure. The following description from the source above mentioned, will be read with interest:

It is detached from the main building. The interior dimensions are 80 feet long, 40 feet wide and about 80 feet high. The engines themselves are what are denominated compound tandem engines of 1500 horse-power, the fly-wheel being 35 feet in diameter and having 40 grooves for ropes, these ropes working on to pulleys in the main body of the mill through the rope-race shown in the drawing. The whole of the interior of the engine house is lined with Burmantoft's faïence, treated semi-constructionally, both the method of the construction and the design being unique and specially adapted to give solidity and breadth of effect. The floor is laid in ceramic mosaic, the windows are of decorated glass, the window frames and all the woodwork being walnut and teak. The color scheme adopted throughout has been directed to secure thorough harmony of result. The dado is carried out mainly in browns and sage greens. The enriched band of the dado is treated in sage-green and rich yellow-brown, with the moldings of deeper brown. The wall surface is a deep rich brown ivory in tone, and the effect of the rustication is considerably enhanced by the beautiful deeper tones of the color developed by it. The moldings of the pilasters are in rich teapot-brown, the panels being picked out with yellow-greens, yellows and browns. The caps are picked out to harmonize with the pilasters, and the frieze, which

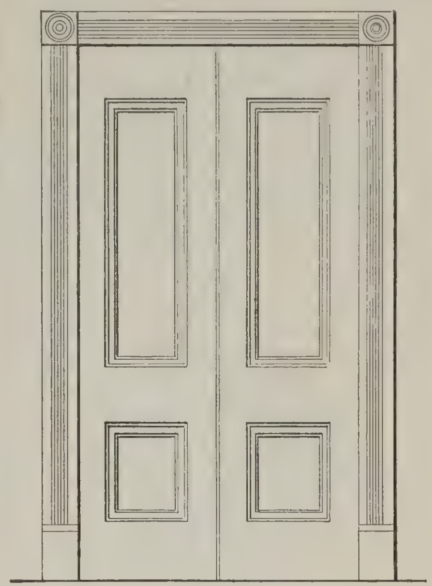


Tower Finial.



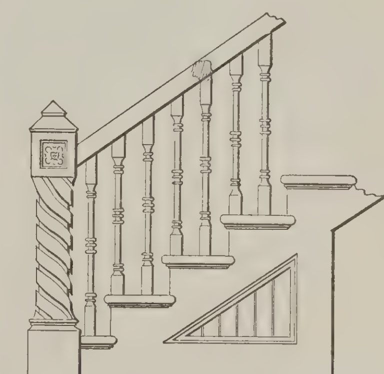
Inside Window Finish.—Scale, ⅜ Inch to the Foot.

is in strong relief, running all around the engine-room, is freely treated in harmonious tints of yellow-greens, brown and yellow. The ashlar above the frieze is treated in pale yellow with brown moldings above and below. The corbels are also treated in brown. The general effect of the ceiling is a combination of brown moldings and light tones of yellow in the panels. The moldings of the ceiling are all in walnut,



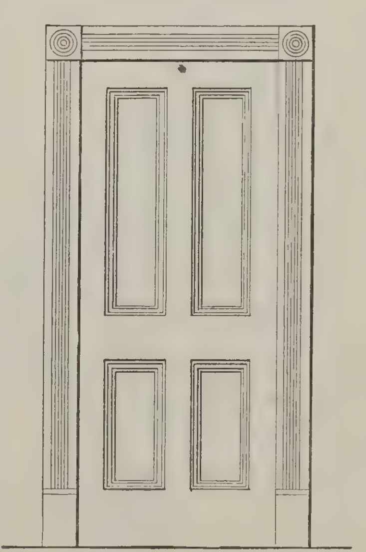
Sliding Door.—Scale, ⅜ Inch to the Foot.

and the upper frieze band is in a quiet tone of faïence. The *Architect* continues: We are not aware that so elaborate an engine-house has been erected in connection with



Front Stairs.—Scale, ⅜ Inch to the Foot.

any undertaking either in this or any other country, and in adopting the use of Burmantoft's faïence Messrs. Coates were actuated by the intention of having primarily a material



Single Inside Door.—Scale. ⅜ Inch to Foot.

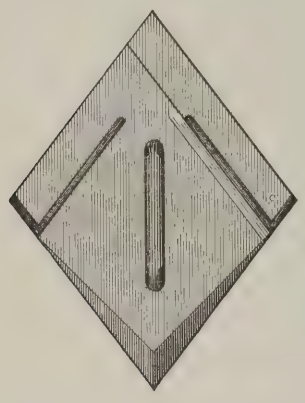
essentially suitable in its cleanliness and durability, and, secondarily, of securing as complete an artistic result as could be secured, and so make their engine-house not

only a show place in the best sense, but one worthy of containing the magnificent engines which form the motive-power for their new works.

ROOFING NOTES.

Thorn's Improved Shingles.

We illustrated some time since the sheet-metal shingles or roofing tile introduced by the Thorn Shingle and Ornament Company, of Philadelphia. In the interval, a number of minor improvements have been made in these



Thorn's Improved Shingles.—Fig. 1.—New Form of Diamond Tile.

goods, which are of enough importance to warrant another presentation to the public. The changes that have been made are in the direction of still further improving the laying and weather qualities of the goods, while, at the same time, all the deirable features of design and construction in other re-

Fig. 2.—Full Size Section through Groove of Diamond Tile.

spects are fully maintained. One of the earliest patterns put upon the market of the series referred to is known as the Diamond Shape Tile, the general appearance of which is indicated by the first of the accompaning engravings. The only objection ever raised

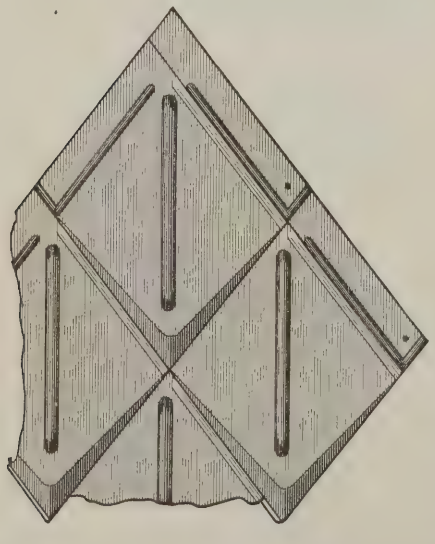


Fig. 3.—Group of Improved Diamond Tile as Laid.

to sheet metal shingles of this form was the possibility of the point raising from the roof, inasmuch as the means of fastening were nails in the flange, midway of the length of the shingle. By a recent improvement this objection which, by the way, we never heard practically urged, has been overcome. A folded crease is made in the flange of the lower shingle in such a way as to permit a projecting flange on the overlapping shingle to engage in it. By this means, the entire

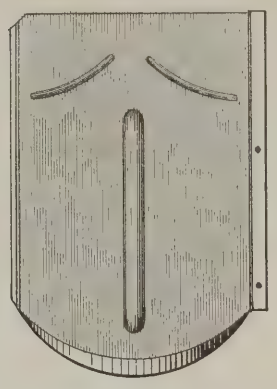


Fig. 4.—Round-Bottomed Tile, with Side Spring Lock.

length of one side of the point is securely held to the overlapped shingle, and yet in a way to permit free movement in the way of contraction and expansion throughout all parts of the shingle. The point is so fastened as to make it impossible to have a "kick-up."

The other shingles of the series, three of which are illustrated in this connection, are similarly treated; but, instead of the groove or crease above referred to, are finished

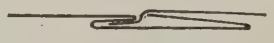


Fig. 5.—Full Size Section through Spring Lock.

with the spring lock which has been applied to another shingle made by the same company. This spring lock contributes a finish and constitutes a construction for these goods which will be generally appreciated by architects and builders. A full size section of the spring lock is shown herewith. A peculiarity of the joint made in this way is, that the united shingles are so held together by the lock that they cannot be

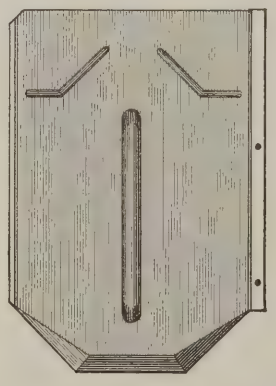


Fig. 6.—Octagon Pattern Tile.

separated save by sliding them apart endwise. No amount of pul in the opposite direction is sufficient to loosen the joint. At the same time there is ample play for contraction and expansion. We understand that the new form of goods here shown will be rapidly substituted for those heretofore manufactured, a very small stock of which still remains on hand. New dies are in a forward state of completion, and when in operation will be employed to the exclusion of the two old forms.

The company are also introducing the hip roll, illustrated in the engravings presented herewith. The roll is of the conventional form largely employed about slate and metal roof and the peculiarity consists in the way it is formed. It is struck up in short lengths in dies with a knob end, and so arranged as to lap over the lower course as it is shingled into position, as may be required. Accordingly the ridging may be used on hips of sharp curve as well as on straight hips. The form imparted to the work by the die causes it to very nearly resemble some of the ridging and hip roofs peculiar to the terra-cotta trade and which constitute a picturesque feature of the spires and steep roofs to which they are occasionally applied. The entire series of roof shingles which the Thorn Shingle and

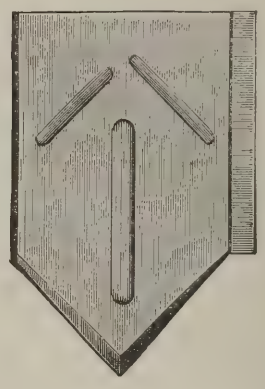


Fig. 7.—Hexagon Pattern Tile.

Ornament Company are putting upon the market in many respects resembles patterns with which builders have long been acquainted, growing out of their general employment in slate, earthen tile, terra-cotta work, and, in some instances, shingle work.

Repairing Roofs in New Mexico.

A correspondent of one of the daily papers, writing from a point in the extreme Southwest, presents an interesting story of

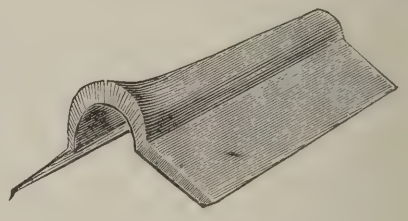


Fig. 8.—Improved Ridge Roll.

how roof repairing is sometimes accomplished in that part of the world. While there is very little that is technical in what he says, there is much that is interesting, and it will serve to pass the time of noon hour during one of the hot days now prevailing; accordingly, we print it in full:

If the ceiling of any room becomes discolored with smoke or otherwise loses the white purity which must always distinguish the interior of "a room for rent," the same native has a remedy which is as effective as it is novel. He takes down the ceiling, puts

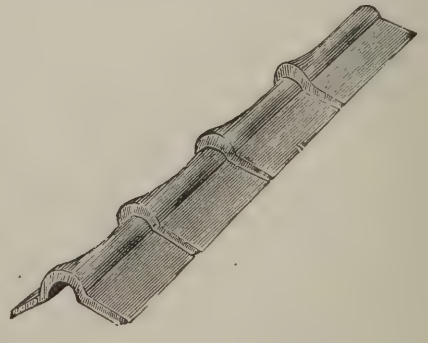


Fig. 9.—Ridge Roll on Building.

it in the wash-tub, and after thoroughly cleansing it restores it to its proper position. As leaks in roofs necessarily have a close connection with room ceilings, I simultaneously gained my knowledge of both occult remedies during a rain storm the other night. When I came here I found that nine-tenths

of the population lived in rented rooms, and that I must do likewise, unless I wanted to pay $17.50 per week for board. So I hired a spotlessly white room in a doby, and went to bed in one corner of it, without thinking for an instant that I would be inconvenienced by the heavy rain-storm prevailing. I changed my mind about midnight, when a stream of water worked its way through the mud roof and dropped squarely down on my head as I lay sleeping in bed. I got up at once and prosecuted a search for a match, while another stream played on my back. I lighted my lamp, and then saw about a dozen streams were coming through the ceiling. As my room opened on the road, after the manner of all Mexican dobies, I was compelled to dress myself, fish an umbrella out of my trunk, and go out into the storm to get into the next room, where my aged and Celtic landlady reposed.

"An' has that roof bruk loose agin? Well, now, jest wait a brace o' minnits till I get some clothes on, an' I'll coom to ye," she said, as she opened her door in response to my exasperated knocks. In four minutes she emerged into the storm, carrying two lamps, and rushed into my room. First she lighted all the lamps and put them around the room so she could see well to do the work ahead. A glance at the scene of action, a vigorous oath and a plunge at the bed followed in quick succession. She put the foot tub to catch the stream of water that was wetting the bed clothing, glared at me reproachfully and then went to work. From the bottom of the wash-stand she brought forth a string and about 3 feet of an old broom handle. The articles, it seems, are always kept ready for use in every doby house in New Mexico. Dragging the table to the center of the room, my landlady put a chair on it and said, with business-like sharpness:

"Now, young man, 'spose you jest turn your back around entoirely-" I faced about and the old lady scrambled to the table and thence to the chair. When I looked slyly over my shoulder she was bending a pin at right angles between her teeth. She then tied the string to the pin and reached up to the ceiling and stuck the pin in. I was startled to see the ceiling bulge downward, and then, for the first time, perceived that instead of being white plaster as I had supposed, it was of white muslin. Having attached the pin so that it would not slip, the landlady leaped down with the other end of the string in her hand. To this end she fastened the piece of broom handle and left it swaying gently before my eyes.

Heedless of my questions, she seized a broom and went around the room gazing critically at the ceiling. Here and there were little blister-like protuberances, where the water had accumulated in little pockets. Each of these the woman pushed upward until the water ran toward the lower level around the point where the pin penetrated the muslin ceiling. The weight of the wooden stick on the end of the string, of course, pulled the muslin downward, making a hollow over the center of the room large enough to accommodate all the little pockets. When the water has thus been accumulated in the central reservoir, I saw a small stream flowing from the end of the swaying broomstick.

"All the water will run down to the pin now, me dear, and thin down the string to the broom-handle and thin down the broom-handle to this bucket, and thin you'll have no more trouble ef you'll jist keep away entoirely from aginst the bucket," announced the woman, oracularly. It was even so. When she had put dry clothing on my bed and left me I turned in again and went to sleep in comfort under a roof that was full of holes. In the morning the bucket placed just under the pendant broom-handle was full of water, but the room was thoroughly dry. By daybreak it cleared up, and the woman's "man" was shoveing an extra cart load of earth on the roof of my room.

"Now, Peter," I heard her call to him, "jist take and sow half a bushel o' grass seed there, so that we will have a fresh sod before the next rain comes" Peter sowed the grass seed while Peter's wife took down the muslin which had been pasted around the edges of the ceiling. She took it away and washed it, and bringing it back soaking wet, pasted and tacked it into position. When I asked why it was not dried before being put up, she said it was desirable to have it wet, so that when it dried the shrinkage would make it taut. An enormous fire dried my ceiling until it was as white and smooth as the plaster of an Eastern domicile. The landlady put away the pin and string and bit of broom handle in the bottom of my washstand, and said respectfully:

"Now, then, young man, if things spring a leak agin you 'tend to 'em yourself, an' don't come arter me. I allers show strangers how to stop a leak once, but I charges extra if they come arter me twict." In two weeks there was an elegant green sward on my roof. The roots of the rank grass form such a compact network that it takes a very heavy storm to wash away enough earth to admit water into the room underneath. For this reason I have escaped a second ducking, and have had no occasion to try my 'prentice hand with the pin and string.

Leaks in Gravel Roofs.

From ANTI-GRAVEL ROOFER.—There are few cases as difficult for the physician to cure as of a person who is mentally and physically worn out. Stock speculators are the ones that usually fall victims to this complaint.

There are few kinds of roofs that are as hard to repair as an old gravel one, when the paper, commonly called felt, is all worn out by the action of sun, rain and air. The gravel of such a roof is about the only portion that is not adulterated. The felt is not much better than building paper, and the "pitch" is often coal tar made thick with rosin. The proper kind of pitch to use is the same as has been used for the preservation of the ancient inhabitants of Egypt. What would an Egyptian think if he was to find his one-thousandth grandfather had been made into a mummy by using the cheap tar from the gas works, thickened with some rosin, such as is used to cover the insides of beer kegs with, so he could be handed down to future generations or burnt in a locomotive as fuel?

At some time in the world's history there was a man who put on a decent gravel roof. The way this first roof was put on is easy to explain. First, a layer of good strong felting was placed on the roof boards. Felting is supposed to be composed of the fibers from the back of the same kind of an animal that became so celebrated for always following Mary to school. The next step was to cover this felting with pitch of the precise consistency of shoemaker's wax. The fibers of the felting would prevent the pitch from running away in warm weather and from breaking in cold, plasterers put hair in mortar to make it strong, on the same principle. To keep off fire, and to also prevent the sun and air from oxidizing the pitch, a coating of clean, warm gravel was put on top. The kind of pitch used was the kind that nature has made such vast quantities of, and which form parts of the pavements of Paris, said to be the finest in the world.

The modern gravel roofer uses a felting that must be made of the waste of everything that is good for nothing, and is like the modern flavoring extracts, contain most everything but what they are supposed to. The writer was on a building once when such a roof was being put on. The building was 20 or 30 feet wide, and as the roofers took hold of a piece of felting at each end and lifted it up to place in position, the felting broke apart in the center by its own weight. It was expected that the roofers would evince some surprise at this mishap; but they did not pay the slightest attention to it; it was probably of too common occurrence.

One kind of pitch is made by boiling down coal tar until it becomes of the proper consistency, the object being to get rid of the light portions of the tar. As this boiling is rather expensive, rosin is added to make the pitch come quick. There is nothing very tough about rosin, and it is pitch that is wanted, not rosin. The gravel used is often damp, which prevents the pitch from sticking, or mixed with dirt, which produces the same effect. If the pitch is made of light oils and rosin, the tendency of this chemical mule is to run in the summer, and crack in the winter—just the opposite of what it should do. The tinner who has had to repair a trough or conductor connected with a gravel roof does not have to be told about the propensity the tar has for traveling. Two roof boards may take a notion to "pitch" up; this makes a small hill from which the tar runs some hot day, leaving the paper underneath all alone to fight the battle with the next rain storm. Then the little raindrops commence to beat on this bald spot, and in a short time the paper is washed away, and the said rain runs through the hole to see who lives in the house. The gravel roofer is sent for in great haste to repair the hole. If he is a natural born (gravel roof) detective, he may; otherwise, he won't. It is said there are people who can read other's minds. It is a big job to read a gravel roof's mind—and find the leak. One kind of man will look in the low spots for the leak: that is just where they are not apt to be found, as the tar goes there to rest. The nickel-plated leak-finder goes on the roof with a hoe, and, on being shown within a block or so of where the leak is supposed to be, scrapes off the gravel so he can see for himself. Then the paper is covered with tar (?) and something put down that has some strength in it, and a liberal supply of tar and gravel put on top. The chances will be that the roof will not leak any more—where the patch is.

The roof doctor should pay especial attention to where the roofing joins the walls, as gravel roofers have a way of nailing on pieces of lath or boards to hold the edges of the paper. It must be evident that these sticks make small troughs to catch the water and let it in under the roof. Then the weight of the materials may be enough to, in time, tear itself apart, as the tar is apt to all run off the first year and the gravel never pretended to stick. Those of the readers of *Carpentry and Building* who have a book describing how Noah's ark was constructed can by reading it find out how that vessel was made water-tight. It was not done with paper, coal tar and rosin. When there is a convention called of those who know who wrote the poem on "Beautiful Snow," and of those who can find a better substance than tin for roofing, then the writer can be engaged for one evening only to tell what he knows about gravel roofing.

Copper Roofing.

From T. & Co., *New Glasgow, N. S.*—We have about 35 squares of copper roofing to put on in a short time, and would be very much obliged to *Carpentry and Building* for some advice as to the way of laying the roof. The building, the plans of which were drawn by a New York architect, is to be fire-proof. The specification calls for 12-ounce copper sheets, 2 feet wide and 9 feet long. The rafters are nearly 27 feet in length. The roof is to be laid standing seam without solder. The heading sheets to be lapped and soldered. The locality being on the sea coast, where very high winds prevail, causes us to fear that such a roof cannot be properly laid in a way to prevent rattling. We have suggested to the company who are erecting the building that the seams be made over square wood strips running from eave to ridge, and that the copper be double seamed over the corner of these strips. What is your opinion of this construction? We have neglected to mention that the roof has a steep pitch. The specifications call for a galvanized iron cornice and finials to lap over the copper roof. We think that this is in bad taste, believing that it would be more in keeping if both kinds of work were done in the same material.

Note.—Some of the best copper roofs that we have ever inspected have been laid standing-seam fashion, with double-locked cross seams, using no solder whatever. There is very little difficulty in making such roofs absolutely tight, and there is no need of their being laid so loose as to rattle unpleasantly in stormy weather. We are favorable to such construction as our correspondent mentions, using wooden strips from ridge to eave, over which to make the longitudinal seams. With the use of such strips

the seams may be variously constructed. In some cases triangular strips are used, and the standing seam is made at the top of the angle, just as though the strip were not in place. In other cases square strips are used, in which the metal is turned up against the strip on each side, with an obliquely projecting edge, and is cleated in position. A cap with a lock on either edge is then slipped in place, embracing the projecting edges already referred to, and the three thicknesses of metal are then hammered down against the standing portion of the copper and the side of the strip. This makes very neat construction, and gives ample play for contraction and expansion. It is better than the plan of using less pieces, and having the flange of one sheet extend over the strip in a way to form a cap. The special points to be regarded in copper-work are freedom for contraction and expansion in all directions, security of fastening, so that the work will not gradually become loose, and careful attention to minor details, with a view to avoiding special strain at different points likely to cause trouble.

Items.

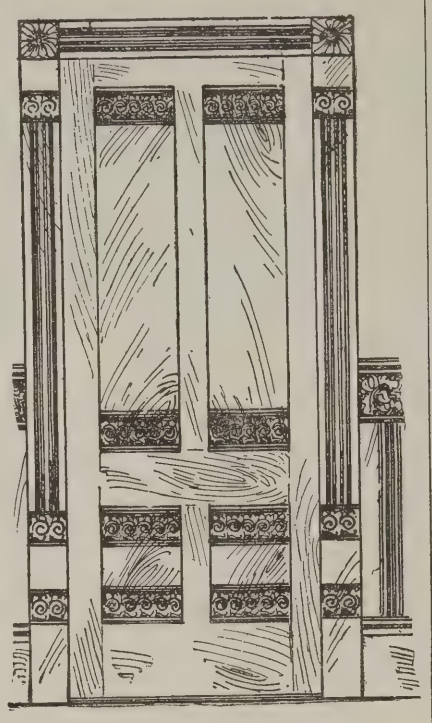
AT A MEETING of the Society of Engineers, held a short time since near London, a paper was read on the renewal of the roof over the departure platform at King's Cross Terminus of the Great Northern Road, by Mr. R. N. Bancroft. A brief history and description was given of the construction of the old laminated timber roof, erected in 1851–52, according to the system introduced by Col. Emy, a French military engineer. After pointing out the entire absence of ventilation in the old roof, and other causes of decay, the author describes the movable staging now being employed in the erection of the ribs of the new iron roof, the way in which it is moved from bay to bay as the work proceeds, and the means adopted for supporting the superstructure of staging so as to give a clear headway for locomotives, &c., and not to interfere with the departure passenger traffic. Reference was then made to a similar roof over the old Great Northern Road passenger station, at Bradford, its span, distance apart of main ribs and weight per bay of 20 feet being given. The construction, hoisting and fixing in place of the new wrought-iron ribs were described; and it was pointed out that they have to be made to fit the existing cast-iron spandrels and stanchions built into station walls. The construction and fixing of the lattice and trussed purlins, and the gangways adopted to give greater facilities for workmen in repairing and cleaning the glass covering were also described. The author remarked on the absence of wind-bracing, and gave the reasons for not using it. He also described the method of glazing, both with putty for the roof generally, and with Helliwell's patent puttyless glazing at the Louvre. Diagrams were exhibited showing the general form of the roof and the movable staging, and the working drawings were also laid upon the table for reference, by the kind permission of Mr. Richard Johnson, M. Inst., C. E., Chief Engineer of the Great Northern Road, under whose instructions the work is being carried out.

W. G. HYNDMAN & CO., of Cincinnati, have recently been making some important improvements, as well as embellisments, in their iron roofing works. The ceiling of the front portion of the factory including the shipping-room, has been handsomely finished in squares and panels, using for the purpose the patent iron ceiling made by A. Northrup & Co., of Pittsburgh. The work was put up by a mechanic sent for the purpose from Pittsburgh, who, at the same time, instructed Hyndman & Co.'s workmen in the method of putting the ceiling in place. The work has been neatly painted in colors, and makes a very pleasing appearance. The inference is, that Messrs. Hyndman & Co. are to handle the Northrup ceiling for Cincinnati and vicinity for the future. We have no information to this effect however.

THE IRON WORK of the roof of the new post office and courthouse for Dallas, Tex., was a short time since awarded to the Marshall Foundry and Construction Company, of Pittsburgh.

Carbonized Wood Decorations.

The accompanying illustrations show the application of "Carbography," the invention of William H. Roystone, of Galveston, Texas. The engravings show some individual tile of



Carbonized Wood Decorations.—Fig. 1.—Door With Ornamented Moldings and Architraves.

wood finished or ornamented by the process; also tile combined in a way to form a wainscoting of the same general character, and the decoration applied to doors and door trimmings. The ornamentation or decoration here illustrated is used in competition with carving and painting. It consists, broadly speaking, of producing the design

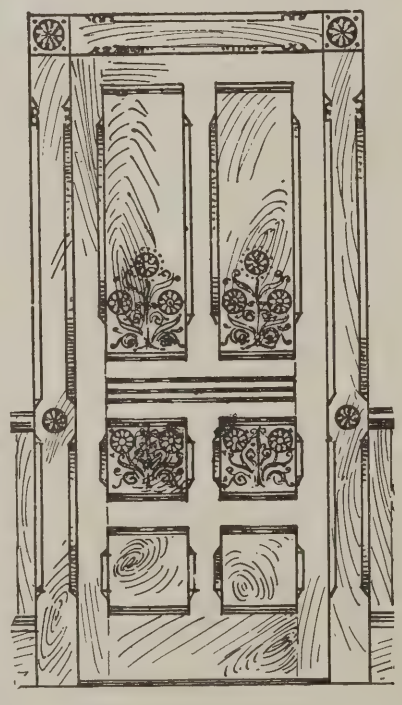


Fig. 2.—Door With Ornamented Panels and Rosettes in Architraves.

in full, clear, raised outline of the natural color of the wood, by means of a branding tool provided on its bearing surface with intaglio lines, constituting a female die and adapted to be forced down upon the body of the wood by pressure. The tool employed for the purpose is of a size and diameter proportioned to the particular work in hand. The mode of procedure, as gained from the patent papers, is as follows: The wood is first dampened by water or steam, and is mounted upon an elastic bed of some suitable yielding substance. The red hot branding tool is then forced down upon the wood with a pressure commensurate to the desired hight of the design to be produced and the gradations of tone and shade sought for. As the solid parts of the die begin to enter the wood they burn orchar its surface at the point of contact. The air contained in the die lines at the same time becomes rarified by the heat, and, together with the steam generated from the contact of the red-hot tool with the moistened wood, forms a non conducting cushion between the die lines and the untouched portion of the wood. The presence of this vapor is sufficient during the above period of application of the tool to prevent the design from being charred. Upon the removal of the tool, therefore, it stands out clear and distinct from the charred background. The presence of the elastic cushion prevents the stamp from making a deeper impression at one point of the wood surface than another which would otherwise happen if slight unevenness should exist upon the surface of the wood. The inventor points

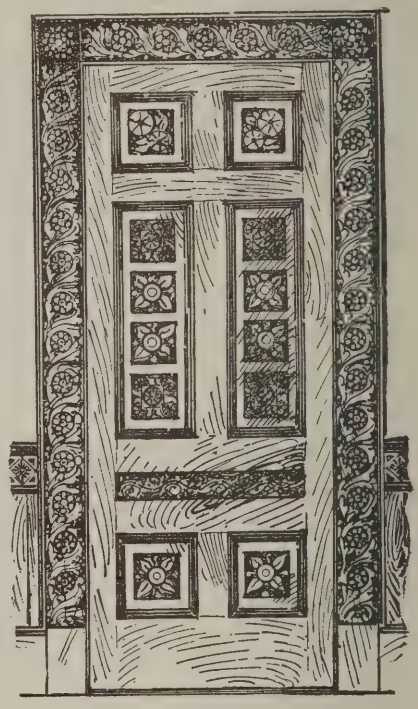


Fig. 3.—Door With Architraves and Panels Ornamented.

out that where the quality of the wood is uniform the cushion may be dispensed with. After the branding operation as above described has been completed a suitable finish upon the article may be effected by applying with a brush a single coating of transparent varnish or shellac, pure or very lightly diluted with turpentine, as the hardness and condition of the wood may determine. The unburned portion of the wood absorbs the coating, leaving the other portions of a dull appearance. The charred background, however, the porous and absorbent qualities of which have been destroyed, retains the varnish upon the surface, which, accordingly, assumes a finished gloss, forming a high contrast to the design proper. If desired a uniform gloss can be imparted to the whole by a second coating. An alternative method of finishing is to impart a gloss to the design by rubbing into it sufficient oil to give the desired polish. The charred background does not absorb the oil and consequently remains in its natural state. This last treatment is specially applicable to hard wood. With reference to the means of applying the branding iron, it is done in some cases by hand and in others by the use of a special machine constructed for the purpose. We are informed by the inventor, however, that the hand pressure is adequate for all ordinary purposes. The process of

manufacture is of such a nature that the desired result can be obtained without the use of steam-power and at relatively a low cost. The inventor states that any design can be developed by the process, so that builders, mill men, and others employing it, can exe-

Carbonized Wood Decoration.—Fig. 4.—Wainscoting Composed of Wooden Tiles.

cute their own designs or the designs of architects in their own workshops. The carbonized portion of the decorated wood shows a rich brown color of varying shades, through which the grain of the wood is seen. A simple way of using the decoration is to apply it to thin wood blocks or tile 4 or 6 inches square, which can then be nailed to any suitable ground to form wainscoting, friezes, ceilings, or other similar work, as required. Any kind of light wood may be used. The decoration shown in the accompany design for doors was executed on the panels before the doors were put together. Corner blocks can be made of any desired thickness, and the architraves may be decorated its entire length if desired. Some specimens of work decorated by this plan have been submitted to us by Mr. Roystone, and we have also examined a large number of designs from him, showing shapes in which the work may be executed and positions in which it may be applied. From these we have reproduced the accompanying engravings. The statement is made that one man can turn out 500 finished tile per day. The wide application possible in this kind of work will be appreciated by our readers, and, inasmuch as the patentee proposes to arrange for local introduction of this style of finish, it is of interest to many among our subscribers.

In writing on the treatment of the cornice, Hosking says: "Although a perfect entablature should not be applied to crown an edifice, except it be in connection with columns of some sort, or their legitimate representatives, piers, yet a single cornice or a cornice and frieze, is not so; and it forms the most pleasing termination to an elevation in which columns are not used. The proportion of one or the other may be best found by setting out a columnar ordinance of the style preferred at the hight of the elevation, and the size of the cornice, or cornice and frieze, thus given will aptly become it. The Vignolan, or block cornice, in which the frieze is occupied by cut blocks, is exceedingly effective. It is this which Sir Christopher Wren has employed in the upper entablature of St. Paul's, and Vignola himself in the front of the Villa Giulia. With these cornices rustic quoins consort very pleasingly; and so they do, indeed, with all single cornices which are of a bold character, and all such should be so."

Hours of Work.

One of the leading questions at issue between the journeymen carpenters and the master builders throughout the country for many months past has been the question of hours of labor. Numerous strikes have been instituted having for their object the definite settlement of this question. Formerly 10 hours per day was the usual rule. Some strikes have been instituted to establish nine hours per day, while still others, notably in Chicago, have had for their object the reduction of the labor day to eight hours. Varying success has attended the different efforts made throughout the country to reduce the hours of work, and yet, on the whole, progress has been made in the direction of shortening the hours of labor. Just what this has resulted in can only be gained from a summary of what has been done. A bird's-eye view of the situation is at once interesting to all who have to do with the building trades and profitable to all who are considering the tendency of the times. The following particulars are gleaned from the *Carpenter*, the official publication of one of the most prominent organizations:

In Troy, N. Y., an agreement for eight hours a day and 30 cents per hour was signed some time since, to hold good until April 30 of next year; none but union men are to be employed, and 45 cents for overtime is the rule. Chicago, Hyde Park, Englewood, South Chicago, Humboldt and the town of Lake have all agreed on eight hours as the result of the two weeks' struggle in April. The question in Chicago was again raised in July, and was settled in favor of the eight-hour day. This seems to be the net result, so far as the eight hour movement is concerned. When we view the country over, however, with reference to the nine-hour limit, we find that much more has boen accomplished. We shall refer to a number of towns in which the movement for nine hours has been suc

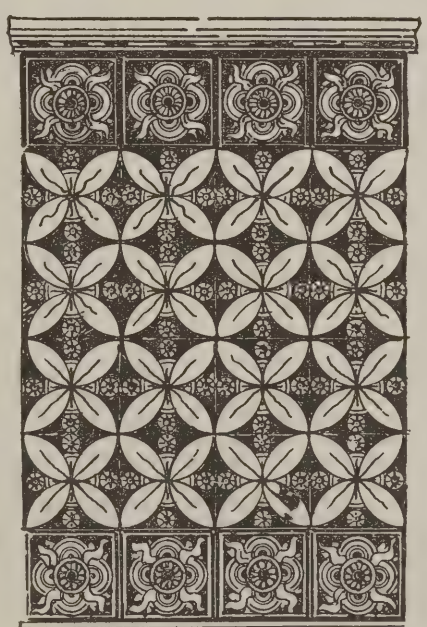


Fig. 5.—Wainscoting Composed of Wooden Tiles

cessful, without any attempt at covering the entire country, or arranging the places in geographical order. At McKeesport, Pa., the nine-hour limit has been established, and the union men have passed a resolution not to work with non-union men. At Milwaukee, Wis., the same conditions prevail. At Denver, Col., it is reported that 47 out of 53 contractors granted nine hours a day, and eight hours a day on Saturday; with pay at $3 per day. At Omaha, Neb., the rule is nine hours per day and eight hours on Saturday, the rate of pay being 30 cents per hour, and time and a

Fig 6.—Wooden Tiles Used in Door Panels, Wainscotings and Ceiling Work, &c.

half for overtime. A strike was instituted at Newburg, N. Y., for nine hours per day and full pay, which was decided in favor of the workmen. The masons and bricklayers supported the carpenters in this struggle. At Albany, N. Y., the rule at present is nine hours per day, and eight hours on Saturday with full pay. Riverside, Cal., reports nine hours and full pay as being the general rule. The result of a five weeks' strike, at Rochester, N. Y., was an agreement upon nine hours on Saturday with full pay, at once, and after November 1, nine hours per day throughout the week with full pay at $2.50 per day as the minimum, and overtime counted as time and

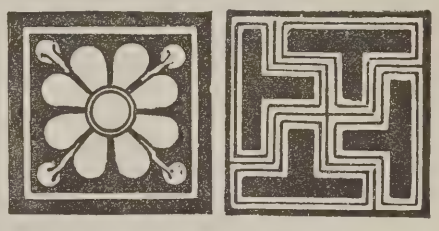


Fig. 7.—Tile Patterns.

a half. This agreement, we believe, holds good until May 1, 1888. In Cambridge, Mass., the conditions are not clearly defined. Early in June the carpenters asked for nine hours and full pay. A large number of employers agreed to this, but no unanimous decision was reached. Pittsburgh, Allegheny City, Braddock and other towns in the neighborhood of Pittsburgh, established the nine-hour rule early in May last. In June, the carpenters at Richmond, Va., adopted the nine-hour limit, which, we are informed, has become the rule in all the union shops. Santa Barbara, Cal., San Bernardino, Cal., and Monrovia, Cal., have carried the nine-hour limit with full pay. This result was reached in the two former places early in May, and in the latter early in June. In Cincinnati, Ohio, the carpenters struck on April 4, and gained nine hours for outside hands. The mill men held out six weeks for nine hours and were defeated and returned to work on the ten-hour basis. Schnectady, N. Y., reports nine hours and full pay. Youngstown, Ohio, on April 4, demanded nine hours and $2.25 per day, which was accorded by the master builders. In Boston, Mass., the rule is nine hours a day with eight hours on Saturday and full pay. This agreement is for one year's duration. Camden, N. J., reports nine hours and full pay $2.50. The union men have agreed not to work with non-union men. The present arrangement is to exist for one year. At Plainfield, N. J., nine hours and full pay has been demanded, and it is reported that more than one-half of the employers have made the concession. Newark, N. J., reports that nine hours and full pay, with the agreement not to work with non-union men is the rule. At Cohoes, N. Y., nine hours a day at 22 cents to 27 cents per hour is reported. At Portland, Ore., the result of a demand made by the men on May 2 is nine hours and full pay. In Detroit it is reported that nine hours is the general rule on all jobs. The same reaches

us from East St. Louis, Waltham, Mass., and Newton, Mass. In Brooklyn the rule is nine hours per day with eight hours on Saturday. The pay is $3.25 and pay on job. Sioux City, Iowa, reports that the nine-hour rule has been generally enforced since May 2. Topeka, Kan., reports that nine hours and full pay is the rule in that place. At St. Louis, Mo., nine hours per day with full pay is the rule; $3 per day is a very common rate. Some jobs are being carried forward on the basis of eight hours per day. At Brockton, Mass., an agreement was entered into by which ten hours should be the rule from May 2 to August 1. Since August 1 the rule has been nine hours a day with no reduction in rates. St. Catharines, Ont., reports that the carpenters demanded nine hours as a day's work and 22½ cents per hour; their demand was conceded. At New Haven, Conn., nine hours and full pay, with eight hours for Saturday were demanded. After a five weeks' struggle the union was defeated in a demand for a signed agreement. Hamilton, Can., a strike occurred in May for an increase of 2½ cents per hour and 55 hours labor per week. This point was carried. The rule at El Paso, Texas is nine hours per day. At Cleveland, Ohio, a large number of contractors have signed an agreement for nine hours; some, however, have not lived up to this agreement; but, it is reported, that wages have advanced from $2.25 to $2.50 per day, and that nine hours is still the rule on many jobs. The nine-hour rule was adopted last year and is still in force in Philadelphia and Germantown, Pa.; New York and Brooklyn, N. Y.; Mobile, Ala.; Pensacola, Fla.; Galveston, Tex.; Memphis, Tenn.; Baltimore, Md.; Washington, D. C.; Toronto, Ont.; Vincinnes, Ind.; San Francisco, Oakland, Los Angeles, Alameda, Pasadena, San Diego, Cal. At Atchison, Kan., the rule is 59 hours per week and full pay. At Charleston, S. C., one hour off on Saturday was conceded by the contractors in order to avoid a controversy. At Rutland, Vt., the rule is nine hours on Saturday. At Steubenville, Ohio, eight hours on Saturday. The demand for nine hours made by carpenters has not been gained at the following places: Brocton, Mass.; Augusta, Ga.; Waterbury, Conn.; Akron, Ohio; Quincy, Ill; London, Canada; Meriden, Conn.; Trenton, N. J. It was partially gained at Hartford, Conn., and Salem, Mass.

New Mechanics' Lien Law in Illinois.

Chicago contractors and builders are more exercised over the new mechanics' lien law, which took effect in Illinois on July 1, than they are concerned about a possible strike by the carpenters. They assert that if the carpenters do strike for eight hours not many contractors will be affected, as most of them are now working on the eight-hour system. The new lien law, however, is regarded as a very serious matter. A meeting of builders was held July 21, at the Chicago Builders' and Traders' Exchange, at which its peculiar provisions were discussed and criticised. The law as it now stands is made up of two acts, the first of which provides for the manner in which a lien may be filed and enforced against a building, and against which there seem to be no serious objections, as it does not affect the contractors. It more fully protects them than did the old law, by giving a right of action to enforce a lien within two years instead of six months. The second act is characterized as a material man's law. If it is constitutional it is a complete protection to the material dealer. The objectionable sections of the law to builders are as follows:

Sec. 29. Every subcontractor, mechanic, workman or other person who shall here after, in pursuance of the purposes of the original contract between the owner of any lot or piece of ground, or his agent and the original contractor, perform any labor or furnish any materials in building, altering, repairing, beautifying or ornamenting any house or other building or appurtenance thereto on such lot or on any street or alley and connected with such building or appurtenance, shall have a lien for the value of such labor and materials upon such house or building and appurtenances and upon the lot or land upon which the same stands, to the extent of the right, title and interest of such owner at the time of making the original contract for such house or the improvement, but the aggregate of all the liens hereby authorized shall not exceed the price stipulated in the original contract between such owner and the original contractor for such improvements. In no case shall the owner be compelled to pay a greater sum for or on account of such house, building or other improvements, than the price or sum stipulated in said original contract or agreement, unless payments be made to the original contractor, or to his order, in violation of the rights and interests of the persons intended to be benefited by section 35 of this act; *Provided*, If it shall appear to the court that the owner and contractor fraudulently, and for the purpose of defrauding subcontractors, fixed an unreasonably low price in their original contract for the erection or repairing of such building, then the court shall ascertain how much of a difference exists between a fair price for the labor and material used in said building or other improvements and the sum named in said original contract. Said difference shall be considered a part of the contract, and be subject to a lien, but in no case shall the original contractor's time or profits be secured by this means only so far as the sum named in the original contract or agreement.

Sec. 35. The original contractor shall, whenever any payment of money shall become due from the owner, or whenever he desires to draw any money from the owner, lessee or his agent, on such contract, make out and give to the owner, lessee or his agent a statement under oath of the number, name of every subcontractor, mechanics or workmen in his employ, or persons furnishing materials, giving their names and the rate of wages, or the terms of contract, and how much, if anything, is due or to become due to them or any of them for work done or materials furnished, and the owner, lessee or his agent shall retain out of any money then due or to become due to the contractor an amount sufficient to pay all demands that are due or to become due such subcontractors, mechanics and workmen or persons furnishing material, as shown by the contractor's statement, and pay the same to them according to their respective rights, and all payments so made shall, as between such owner and contractor, be considered the same as if paid to such original contractor. Until the statement provided for in this section is made in manner and form as herein provided, the contractor shall have no right of action or lien against the owner on account of such contract, and any payment made by the owner before such statement is made, or without retaining sufficient money if that amount be due, or is to become due, to pay the subcontractors, mechanics, workmen, or persons furnishing materials, as shown by the statement, shall be considered illegal, and made in violation of the rights of the persons intended to be benefited by this act, and the rights of such subcontractors, mechanics, workmen, or persons furnishing materials to a lien shall not be affected thereby. In order that the owner, lessee, or his agent may be protected, he may at any time during the progress of the work demand in writing of the contractor a statement herein provided for, which shall be made by the contractor and given to the owner, lessee, or his agent, and if such contractor fail to furnish such statement within five days after demand made, he shall forfeit to such owner the sum of $50 for every such offense, which may be recovered in any action of debt before any justice of the peace.

The attorney of the Exchange, Mr. E. F. Prussing, in answer to many questions from members, said the provisions of the law might be waived by any owner by not requiring receipts on statements. He thought the poor, but honest contractor would be the great sufferer under the new law, as it would be almost an impossibility for him to comply with its provisions. He would have to pay cash for his goods, or make frequent affidavits in order to get his money. In such a case the owner would practically make a contract with an honest man of insufficient capital, and then erect the building himself. The owner would have to see that all statements were true before he made any payments. The material men might waive all liens, and then if the owner and the architect could agree that these were the men who furnished the material for a building they could settle with the contractor. If not, they would require an affidavit or proof. The new law affected all existing contracts as to material furnished or work done since July 1 the same as contracts made since that date. If a million brick had been contracted for and one-half had been delivered prior to July 1, it would affect the other half million if the money for the first had not been paid. An owner might sign a contract waiving all provisions of the law, but by this act he would not be absolved from paying subcontractors, material men or the immediate employees of the original contractor. The contractor could avoid all trouble by paying cash for material and to subcontractors and employees. A material man selling to a subcontractor had no remedy under the lien law. He became a second subcontractor and could not enforce a lien against the owner.

The discussion which followed evoked the general conclusion that contractors would have to be able to control sufficient capital to complete a building entirely, and then hand it over to the owner. In other words, contractors and builders of limited means would be driven out of the business if the terms of the law should be strictly enforced. No action was taken by the Exchange, as the intention of the session was only to bring the provisions of the law forcibly to the attention of the builders, in order that they might be in a position to act without violating its provisions.

Summer House.

We present in Plate XXXV a perspective view, elevation section and plans of a combined toolhouse and summer-house, arranged in a way to meet many requirements. The base of the building, it will be noticed, is circular in plan, while the summer-house portion is octagonal, with a steep roof terminating in a finial, of which the points of the compass are a conspicuous feature. Stairs lead up to the summer-house or pavilion, and are placed at an angle so as to make a turn at the top of the stairs. The landing is wider than the stairway, so as to furnish a sort of alcove or resting place just outside of the pavilion door. The summer-house is furnished with seats on its several sides, and is lighted with windows glazed with small glass. The entrance to the toolhouse is underneath the stairs. The perspective view shows how such a building might be located in the grounds about a residence, and, when surrounded with foliage, add much to the attractiveness of the landscape.

Rosettes are very popular ornaments at the present time in different styles of architecture and in different materials. Writing on this subject Smirke says: The rosette, or patera, is perhaps one of the most universal ornaments in the whole range of art. It occurs in the paintings of the Egyptians, and is carved on Hindoo sculpture. It was embroidered on the garments of the Assyrians, and ornamented their armlets, bracelets and even their whip-handles. Nor on the sculptured remains of Persepolis is it wanting. The rosette is painted on the fictile vases of all ages, from the earliest to the latest, and has ever been one of the most common of all the ornaments of architecture. May I not venture to claim for this form also a sacred origin? The winged circle was the emblem of the Deity in Egypt, Assyria and Babylonia. In occurs frequently in the marbles, and is usually filled in with what has the appearance of a rosette, but when the circle is large, we find the inserted figure to have a star-like form, or a radiation of tapering flames. May this not be supposed to typify the sun, the great and earliest object of idolatry? Is it not at least a plausible hypothesis, that this figure, whether it be a conventioual representation of the sun or a star, may in the course of time have assumed in the hands of the artificer the varied and beautiful ornament with which we are so familiar?

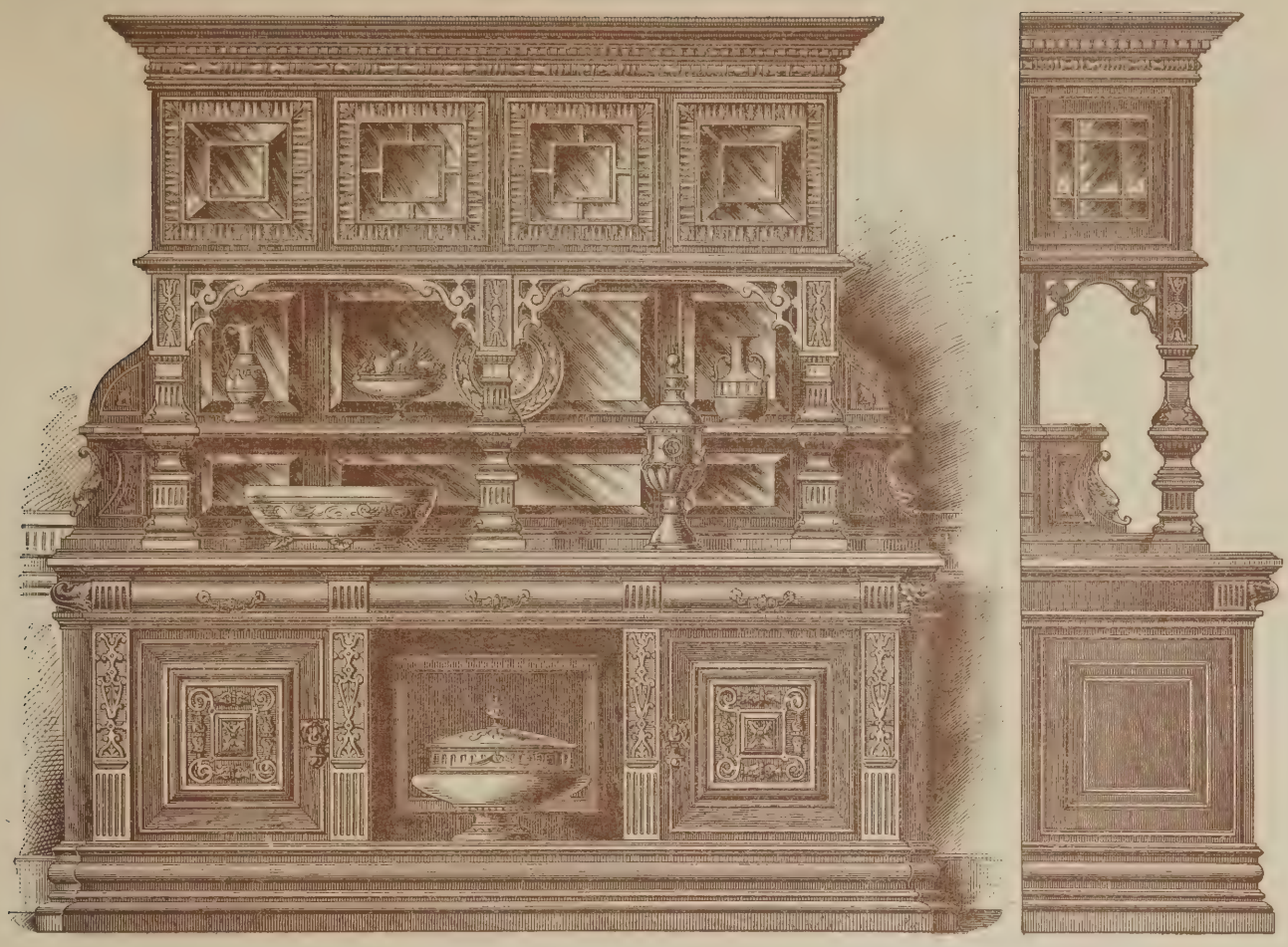


Fig. 1.—Front and End Elevations.

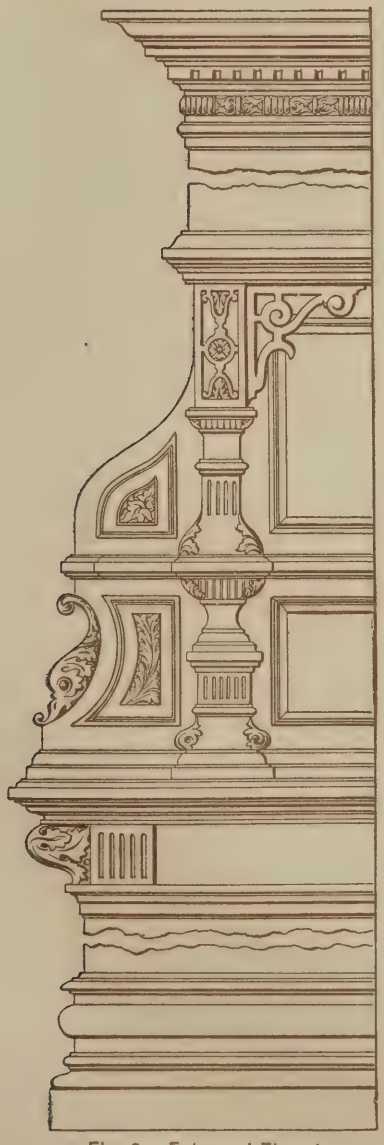


Fig. 2.—Enlarged Elevation.

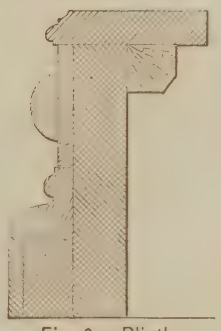


Fig. 3.—Plinth.

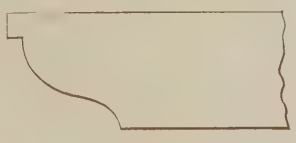


Fig. 4.—Shelf.

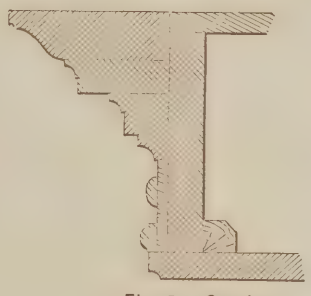


Fig. 5.—Cornice.

Fig. 6.—Framing of Panel.

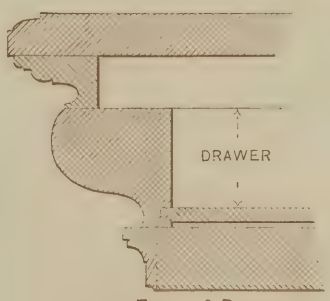


Fig. 7.—Front of Drawers of Upper Cupboard.

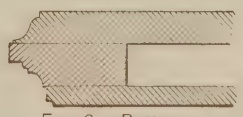


Fig. 8.—Bottom.

Fig. 9.—Pilaster

No. 10.—Panel.

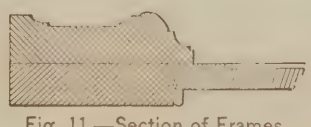
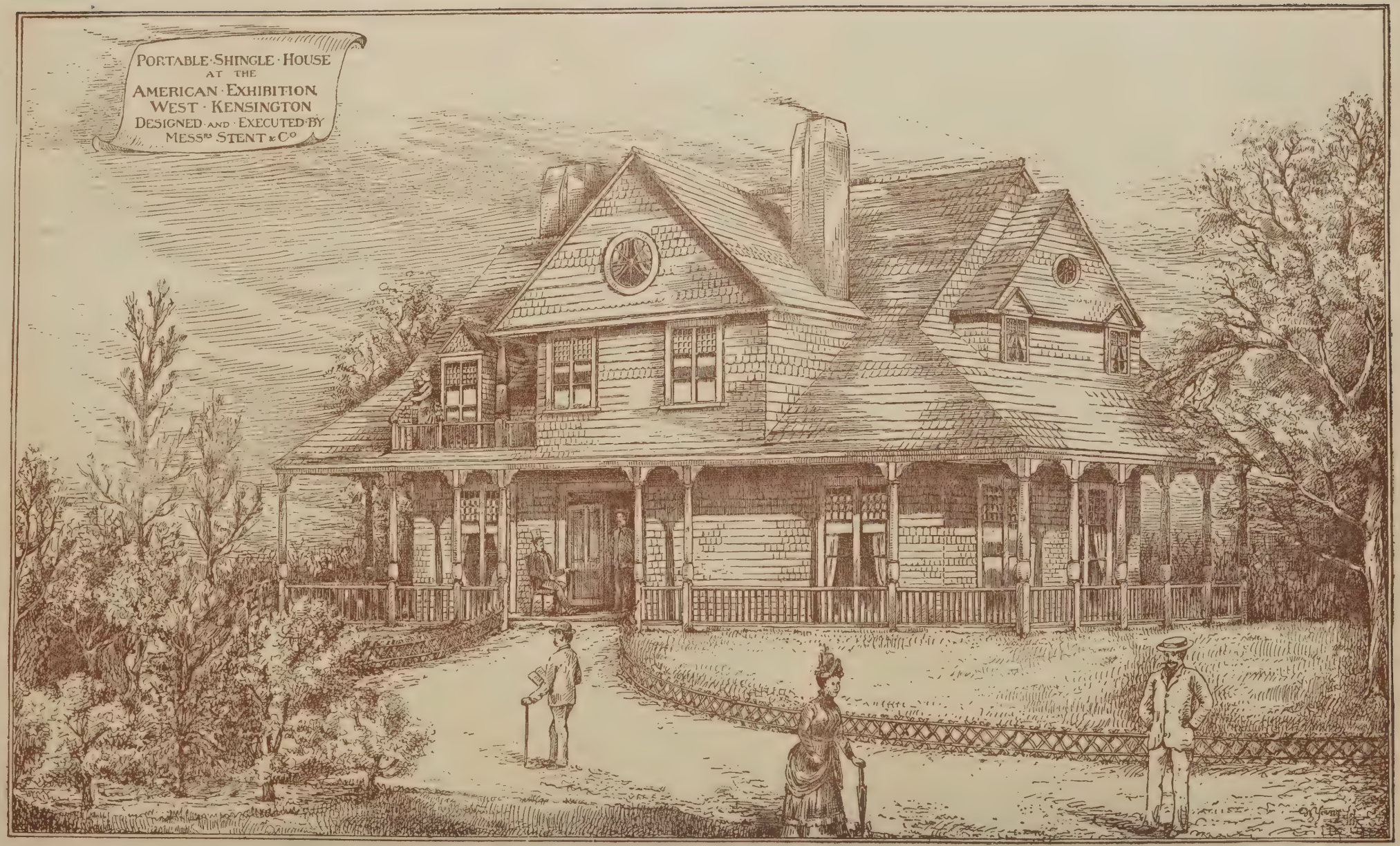


Fig. 11.—Section of Frames.

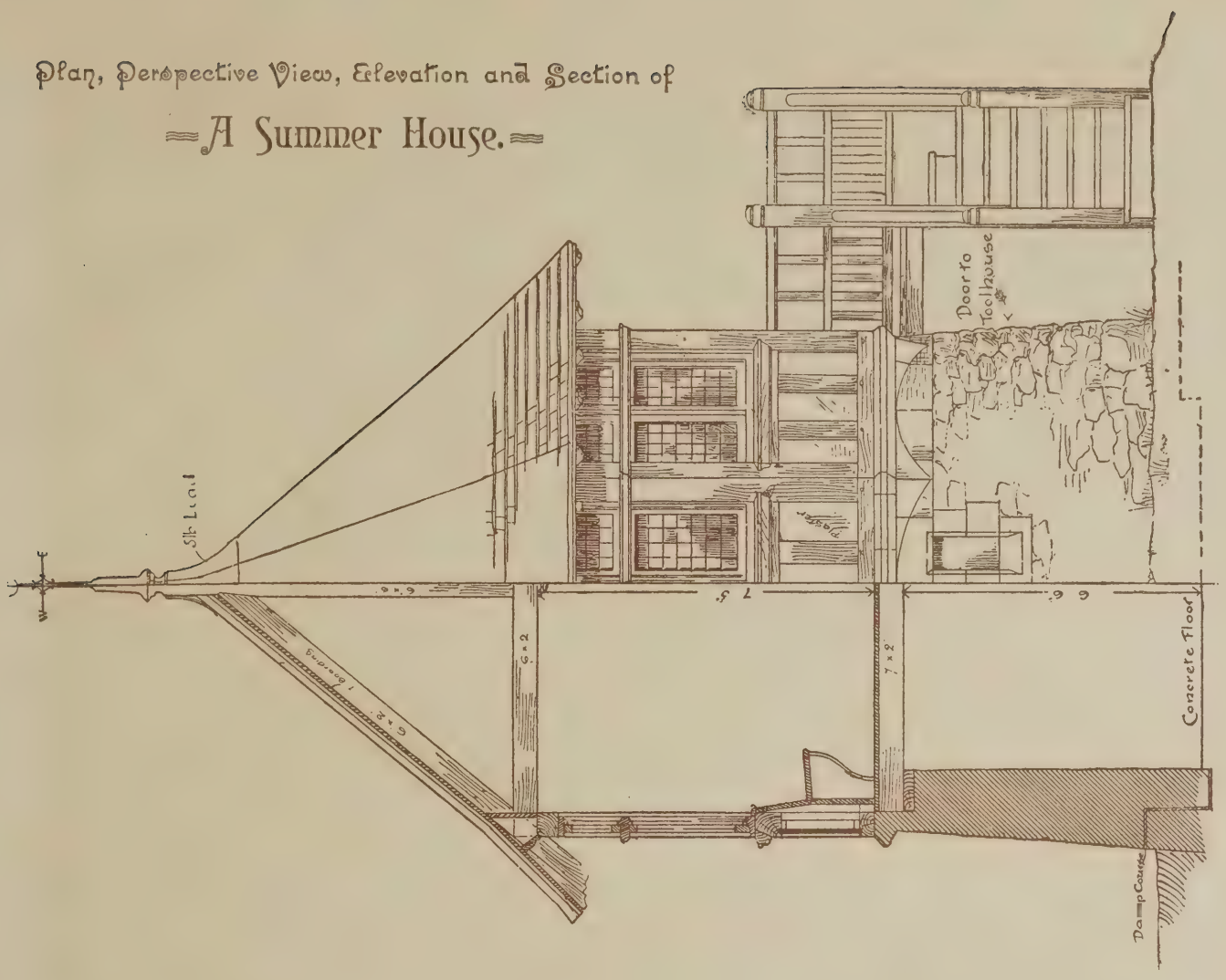
Elevations, Sections and Details of Sideboard.

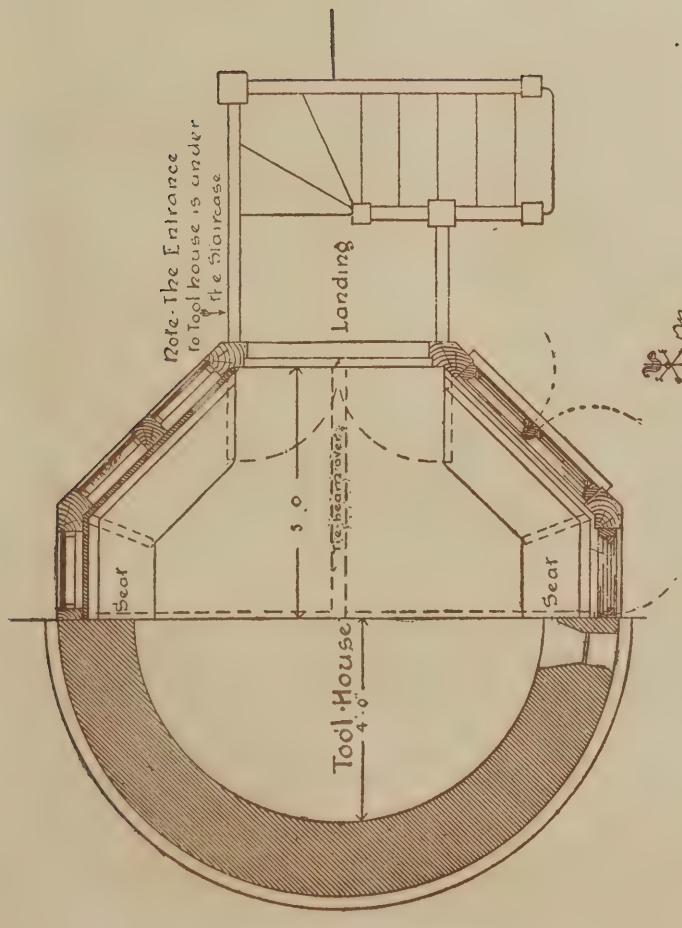
(See pages 172—174.)

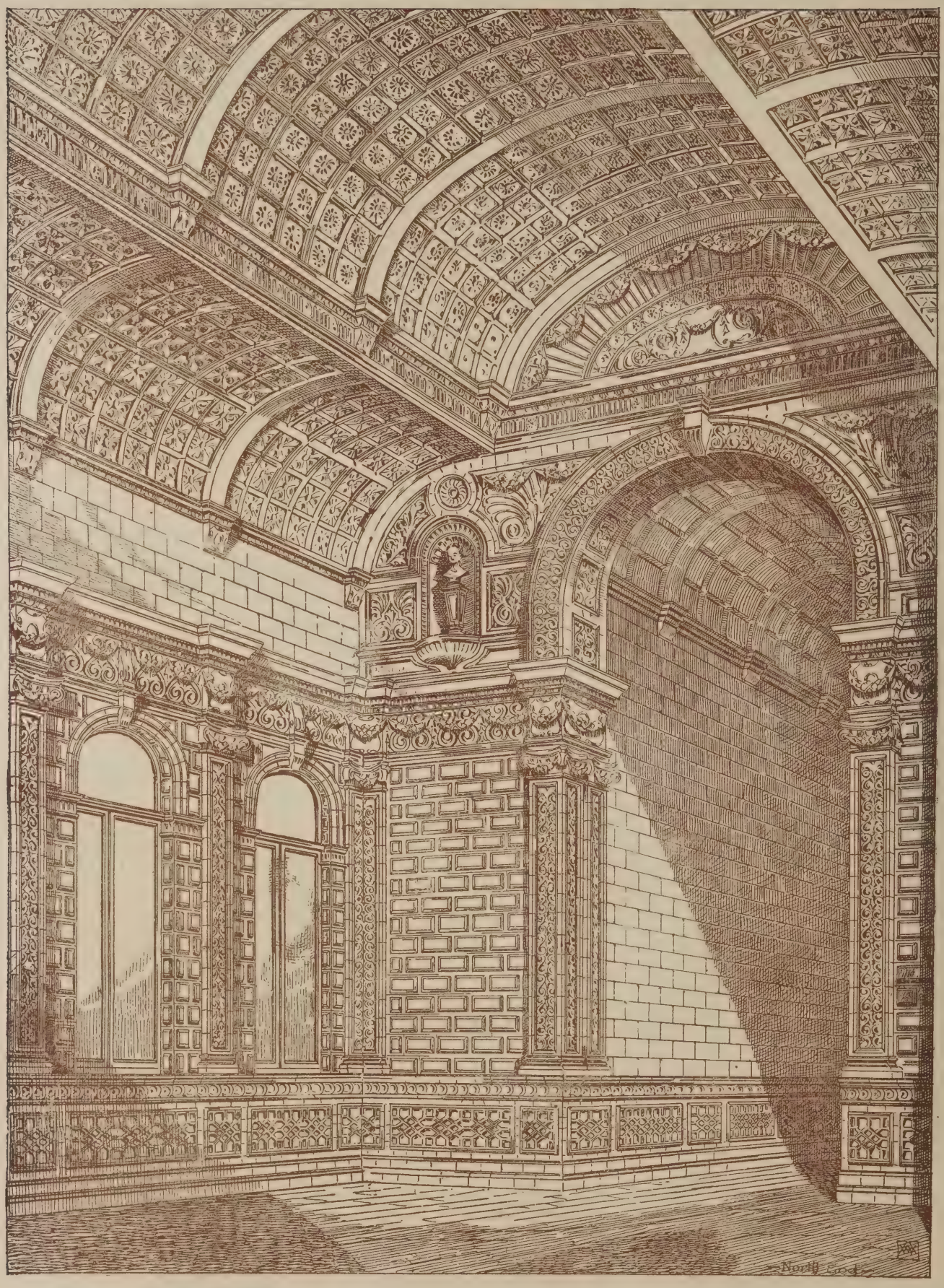


THE SHINGLED HOUSE AT THE AMERICAN EXHIBITION, LONDON.

Plan, Perspective View, Elevation and Section of
A Summer House.







Engine Room in the New Mill of J. & P. Coates, Paisley, England,

Illustrating the Use of Glazed Brick.

CORRESPONDENCE.

Steel Square Problem.

From FRED LASCY, *San Francisco, Cal.*—Referring to the article in your July number, entitled "Steel Square Problems" (with its diagram), I notice one error. The rule given to find the butt cut across the square edge is true only when the solid has a base with square corners. The rule would read better thus: Tan. butt cut across square edge $= \frac{\text{rise}}{\text{run}}$ cosine. By the steel square, place the rise on the blade; place A G (run cosine) on the tongue, and mark along the tongue for the butt cut across the square edge, for solids whose bases have square corners. A general rule for the butt cut across the square edge for all possible cases, requires a special diagram, much explanation, and is more curious than useful; therefore not forwarded. All the bevels given in said article, except this one case, are found in the study of the right trihedral, or right triangular pyramid.

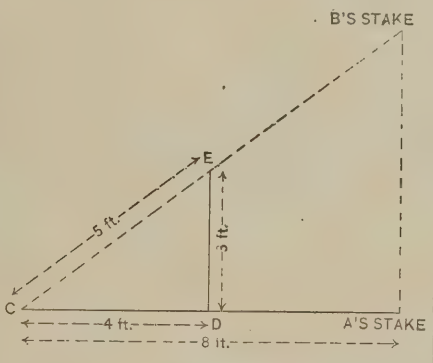
Damp Walls.

From W. B. S., *Flemington, N. J.*—As the subject of damp walls is being discussed in *Carpentry and Building*, it has occurred to me to present my opinions, based upon experience and observation during a period of 45 years that I have worked at building. In the first place the question arises, What causes damp walls? My theory is that the difficulty is caused for the most part by the moisture in the atmosphere condensing on the surface of the walls. We have all seen vessels containing cold water becoming damp on the outside under certain conditions of the atmosphere. This dampness is explained as being the condensation of the moisture in the atmosphere, and I think the same reason explains the dampness of walls. Another fact to be observed is that the harder any material is the colder it is, and therefore more liable to "sweat," as it is commonly expressed. Some authorities recommend hollow walls as a preventive of dampness. This may answer to a certain extent, but it does not entirely overcome the difficulty. Some years ago I built a frame house for myself, and had the walls filled with bricks on edge, leaving a space of 2 or 3 inches between the bricks and the weather boarding; yet I have seen some walls constructed in this way so wet that the water nearly ran down them. A few years ago a man was preparing to build a frame house, and his builder advised him to fill in with brick on edge and to leave an air space as I have described. Subsequently, he came to me, and, of course, in view of my experience, I did not agree with the advice he had already received, and I frankly stated the reasons for my position. I told him that if he had some soft material with which to fill in, he might use it against the weather-boarding, and thus secure dry walls. To prove it, I asked him if the house in which he then lived was not filled in with clay and mortar, and held in place with sticks and straw. He answered affirmatively. I then asked him if the walls were ever damp. His reply was that they were never damp. Of course they were not, for the clay, being a soft material, was never colder than the atmosphere, and, therefore, could not sweat. I told him if he could get sun-dried brick, he could fill in with them, laying the brick flat, and thus secure dry walls. He acted upon this advice, and the work proved to be a success. Another theory sometimes advanced with brick buildings is to cement the walls on the inside, and this, it is said, will prevent dampness. A few years ago I put up a brick building. One room in the rear part of the building the owner said he did not wish to have lathed and plastered; instead, he preferred to cement it on the inside, in order to prevent dampness. While I did not agree with him, I executed the work according to his directions. Some time after the building was finished, there came a day when I thought the conditions were about right to cause the walls to sweat, and, accordingly, I went to the house to see the effect. I found the water trickling down the walls.

Note.—These remarks, from the experience of an old builder, will be read with interest by our readers, and while we cannot expect all to agree with him in every respect in his explanations of causes, there is much that he has presented which is food for thought, and, perhaps, it may call out still other letters on the subject. In anticipation of such discussion, we will refrain from extended remarks at this time.

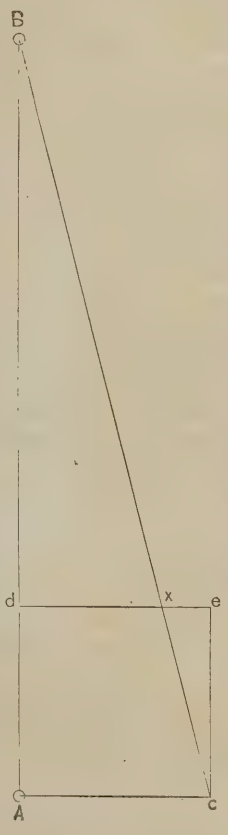
The Stake Problem.

From J. M., *Boston, Mass.*—B. drives his stake to suit his fancy; A. does the same. A. then forms a right angle with B.'s stake



The Stake Problem as Solved by J. M.

He measures 8 feet from his stake to a point denoted by C in the diagram sent herewith. He then forms an imaginary line from C toward A, 4 feet, as denoted by D in the diagram. He now lays on the line from C to D, and forms a smaller right angle. He draws the line D E, and by measurement finds it to be 3 feet. This line is, of course, perpendicular to A C. Then the distance from A to C, 8 feet, multiplied by the distance from D to E, 3 feet, and divided by the distance from C to D, 4 feet, will give the distance from A.'s stake to B.'s stake—in other words, 6 feet. If your correspondent "S. J. P.," desired to find the distance from C to B in the right-angle triangle thus formed, he could obtain it from the measurements given. Thus we find the distance from C to E to be 5 feet. Then, C E, 5 feet, multiply by C A, 8 feet, and divide by *d* A D, 4 feet, which will give the distance from C to B 10 feet.



Solution by A. H. P.

From A. H. P., *Lane Park, Fla.*—In the accompanying figure let A = position of A.'s stake and B = position of B.'s stake.

A. will commence by measuring off 10 feet with his 10-foot pole in the direction of B. and marking the point *d*. He will then lay off a square, A *d e c*, on the line A *d* (this he can do with his square and pole). Now, A *d*, A *c* and *c e* are each equal to 10 feet. He will now set a mark at *x*, the point at which B *c* and *d e* intersect (this he can do by sighting), he measures *x e* (which, say for example, measures 2½ feet). Then the sides of the triangles A B C and *e c x* being respectively parallel, the triangles will be similar.

Hence, *x e* : *c e* :: A *c* : A B

or 2½ ft. : 10 ft. :: 10 ft. : A B

or $A B = \frac{10 \times 10}{2\frac{1}{2}}$ ft. $= \frac{100}{2\frac{1}{2}}$ ft. $= 40$ ft.

The distance between A. and B.'s stakes is therefore 40 feet. The above could be accomplished without the aid of a carpenter's square, as the result would be correct had A *d e c* been a rhombus in place of a square.

Calculating Shingles.

From C. F. H., *Hickernell, Pa.*—Since a shingle is 4 inches wide, there are three shingles to a foot. Multiply the length of the roof by three, obtaining the number of shingles in a course. Find the length of the rafter and divide by the number of inches the shingles are to be laid to the weather. The result will be the number of courses. Multiply the number of shingles in one course by the number of courses, which will give the number of shingles required for the roof.

From L. H. R., *Energy, Mo.*—In reply to "S. J. H." in the May number of *Carpentry and Building*, I will give my rule for estimating shingles. First, get the square feet in the roof by multiplying the length by the width. Then, if the shingles are to be laid 4 inches to the weather, multiply by 9. If they are to be laid 4¼ inches to the weather, multiply by 8½, and if 4½ inches, multiply by 8 inches. For shingles laid 4¾ inches multiply by 7½ inches, and for 5 inches by 7⅕. This will give the number of shingles required for the roof. I always finish with a 6-inch comb-board, which just balances the double course at the eave in the calculation.

From J. E. M., *Cookport, Pa*—In reply to your correspondent who asks about estimating shingles, I will submit my plan. After finding the exact length of rafters on a roof, I divide the length of the rafter by the amount of shingle to be placed to the weather. This by adding 2 will give the number of rows; multiply this by the number of shingles in each row, which will be found by multiplying the length of the roof by 3, the number of shingles that will cover a foot, this will give the desired result. For example, required, the shingles to cover a roof having rafters 12 feet 6 inches long, and the building being 40 feet, the shingles to be placed 5 inches to the weather; 12 feet 6 inches equal 150 inches, which divided by 5 give 30, and adding 2 gives 32, the number of rows of shingles, counting from eaves to ridge. Multiplying the length of the building by 3 gives 120, the number of shingles in each row; 120 multiplied by 32 gives 3840, the number of shingles required to cover the roof in question.

From S., *Stanton, Mich.*—One of your Oregon correspondents, in the June number, asks for a correct method for calculating shingles to cover roofs of certain sizes. The following is my way of arriving at the result: Take the length of the rafters in inches, including the projection, and divide by the number of inches the shingles lay to the weather. The result will be the number of courses. Multiply the length of the roof in feet by 3, which is the number of shingles in 1 foot, and the result will be the number of shingles in one course. Then multiply the course by the number of shingles in a course, and the result will be the number of shingles required to cover one side of the roof. If the roof is double pitched, and both are equal, it is simply necessary to double this amount.

From S. J. P., *Madison, Wis.*—In answer to the question proposed by "S. J. H.," I would say that I use a rule printed in the "House Carpenter's Companion," on page 100, and find it satisfactory. The rule is as follows: "One thousand singles laid 4 inches to the

weather will cover 110 square feet; laid 4½ inches will cover 125 square feet, and laid 5 inches will cover 135 square feet."

From H. P., *Webberville, Mich.*—In answer to "S. J. H.," who asked a question with reference to calculating shingles, I would say: First, decide on the number of inches to be laid to the weather. Multiply this by 4, which gives square inches covered by each shingle. Multiply the length of the roof by the hight, both in inches, and divide this amount by the former, which will give the number of shingles required. A barn that I finished a short time ago had a roof 22 feet wide by 47 feet long, and the shingles were laid 5 inches to the weather. Multiplying 5 inches by 4, we have 20 square inches to the shingle. Multiplying the width of the roof by the length, expressed in inches, and dividing by 20, gives 7,444⅘ shingles. On the other hand, if both roof and shingles are known, to find the distance laid to the weather I proceed as follows: Multiply the number of shingles by 4 inches, and divide by the length of the roof to find the number of tiers contained. Then divide by the length to find the distance of each. For example, taking the number of shingles above and multiplying by 4, gives 24818/5; divide this by 47 feet gives 52⅘ tiers; divide this by 22 gives 5 inches to the weather.

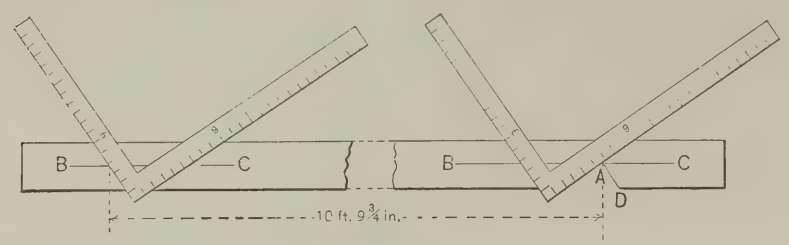
From G. W., *Shannon, Ill.*—First figure the number of feet in the roof, then calculate by the square of 100 feet as follows: If laid 4 inches to the weather, there will be required 1000 shingles to the square. If laid 4½ inches to the weather, 900 shingles; if laid 5 inches, 755 shingles, and if laid 6 inches, 625 shingles. I have used these rules for some time past and have found them satisfactory.

"Jerry" Building in Kansas.

From D. P. B., *Lyons, Kan.*—I want to say a word about the carpentering business in his vicinity. "Jerry" building is rampant. The trade is badly demoralized. A $300 building is peddled around town for bids to see who will do the work the cheapest and poorest. Even public buildings are built on he pauper plan. The owner furnishes tverything. He lets the plastering to one man, the painting to another, while the bricklaying, carpentry and each of the other parts is similarly portioned out. To see the cheap mechanic with a rusty, low-priced saw and iron square, who does not know whether geometry is liquid or solid, and who figures upon anything on which he feels confident he can make $1.50 a day, is anything but encouraging. Building in the West is demoralized, and is impoverished by woodbutchers. You hear nothing but boom, boom, boom, build to sell, build to rent and build as cheap as you can. Every little structure is magnified beyond all reason. men are flocking here to work, and many who are here already are idle. Another peculiarity of the building business, in this neighborhood at least, is that nine-tenths of all the houses are mortgaged before completion. At the same time, we boom on. Probably 100 buildings have been erected in this town so far this season, costing under $1000 each. All of them were built on speculation. One thousand dollars out here gives only a small, one-story five-room cottage. Some of the buildings referred to are as frail as an Indian canoe. A two-story brick block was erected here last year, with 8-inch walls for the second story and finished with wooden partitions. Such is Western building.

Cutting Rafters.

From G. J., *Coopersburg, Pa.*—Replying to the communication from "S. J. P.," published in *Carpentry and Building*, I would say that his rule for cutting rafters would help him very little in this locality. I have a rule for cutting rafters for any pitch that perhaps may be of interest to the readers. I merely add the square of one-half the width to the square of the hight of pitch, and extract the square root of the sum. The square of one-half the pitch would be 9 × 9 = 81, the square of the hight would be 6 × 6 = 36, making a total of 117 feet. The square root of this is 10 feet, 9¾ inches. I then get a nice straight rafter, and make a short line at each end to correspond to the thickness notched to the heel end. Then I take my square and lay it on with the 6 and 9 inch mark at the edge of the rafter at heel and square down. Next, I measure the length—10 feet 9¾ inches—from point to point, and apply the square as before. This is all illustrated in the accompanying sketch.



G. J.'s Method of Cutting Rafters.

Note.—Our correspondent's rule is interesting; but we fear that some of our readers will say that they are not up in extracting square roots and figuring work in this way. However, there is nothing like knowing how to do such things, and it may pay our readers to brush up some of their old arithmetical rules.

Names of Parts of Roof.

From A. J. HERMANN, *Mo.*—Will you please give in *Carpentry and Building* the different pieces of timber belonging to the different principal rafters marked in the accompanying sketches?

Answer.—The accompanying engravings have been made from the sketches inclosed by our correspondent. He uses the term rafters above, when, evidently, by the nature of the work shown, he means trusses. We will attempt to supply the names of the different parts as they are commonly designated by mechanics and writers upon architectural topics. Usage does not always agree in matters of this kind, and therefore we should not be surprised if some of our readers should take exception to some of our answers, or suggest alternative terms. We shall be glad to have the question considered by our correspondents. Referring to our correspondent's sketches, reproduced herewith, the names of the parts indicated by the letters are as follows: A, principal rafter; B, brace ties; C, collar beam; D, king post; E, strut; G, tie beam; H, post; M, king rod or king bolt, while for R we do not find any special name. As mentioned above, we shall be glad to have our readers take up this subject.

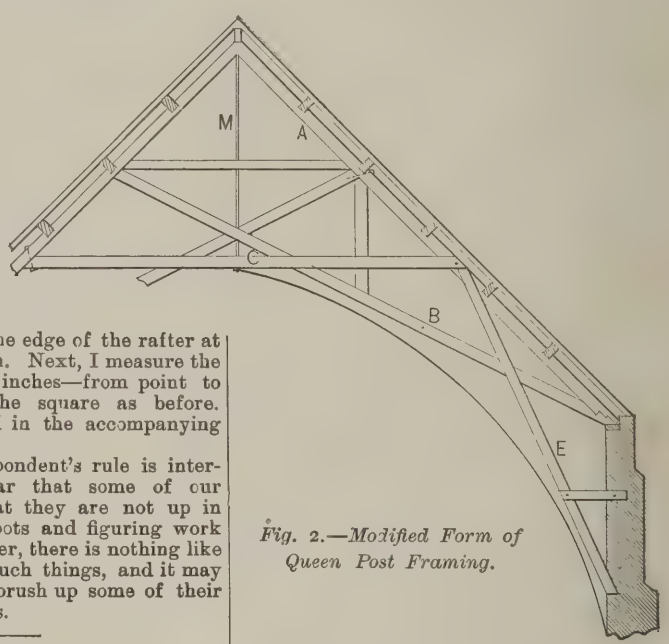
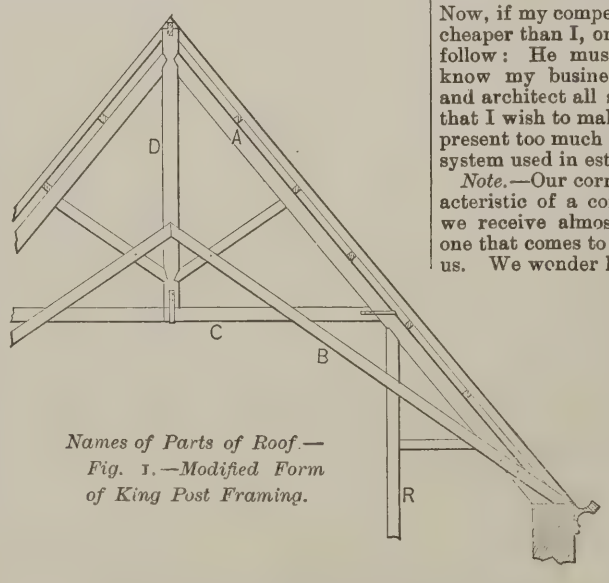


Fig. 2.—Modified Form of Queen Post Framing.



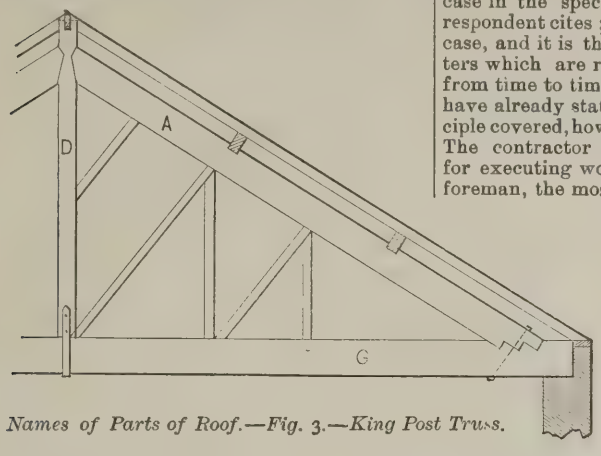
Names of Parts of Roof.—Fig. 1.—Modified Form of King Post Framing.

Estimating.

From G. N. C., *Hancock, N. H.*—I have been waiting for years to see in *Carpentry and Building* something about estimating. What I desire is a simple rule or system which will enable me to estimate correctly the labor on different jobs. I can figure materials of all kinds with very little difficulty; but the work, especially on new designs, bothers me. Last summer I had charge of a job where the labor cost about $1100. I kept an accurate account of the work from beginning to end, and later in the season I put in a bid for a job almost the same, only not quite so large, and based my estimate on the cost of the first job. I was underbid more than $200 on labor alone. Now, if my competitor can do work so much cheaper than I, one of the two things must follow: He must lose money, or I don't know my business. Nevertheless, owner and architect all seem satisfied. The point that I wish to make is this, that there is at present too much guess work, and too little system used in estimating.

Note.—Our correspondent's letter is characteristic of a considerable number which we receive almost every month, and each one that comes to hand is a fresh surprise to us. We wonder how it is that men of the experience that the writers seem to have in many cases can submit questions in the way they do without seeing the absurdity of their position. Take the present instance as an example; our correspondent's conclusions are very logical. He says, that if his competitor can do work so much less than his figures, as the bidding indicates, one of the two things must follow—viz., that he will lose money, or else that the writer does not know his business. Now, it may be that his competitor will make money, and yet it would not neces-

sarily follow that our correspondent does not know his business. Understanding a business, and having the facilities for doing work cheap, or having the talent for managing labor and getting the most out of it, are not, necessarily, the same thing. All of



Names of Parts of Roof.—Fig. 3.—King Post Truss.

our correspondents, in writing upon the subject of estimating, fail to see that the item of labor may differ in various localities, and all of them leave out of consideration the special facilities which different contractors or mechanics may employ. To illustrate by an extreme example: Supposing that a system of estimating had been invented and come into use years ago, when it was customary for builders to make their own sash, doors and blinds. The making of sash by hand, for example, is a laborious and expensive process. Nevertheless, the system calls for hand-made sash, and the figures in a certain contract are made accordingly. The bidder fails to recognize the progress of 50 years time and resolutely hangs to the old method and puts in his estimate. A competitor beats him badly, and he at once concludes that either the competitor must lose money or else he does not know his business. Perhaps he does not know his business in the broad sense of the word, and yet he may be an honest mechanic and one competent to manage a building, and it is possible that under his management a better building would be put up than by the cheaper plan. But the point we desire to make is, that the man who has kept up with the times has the advantage over him, and can bid lower than any one who has not kept up, and at the same time make money. Now, this may not, in any respect, be the case in the special instance which our correspondent cites; but it might have been the case, and it is the case in some of the matters which are referred to us for attention from time to time. Our illustration, as we have already stated, is extreme. The principle covered, however, applies in many cases. The contractor who has the best facilities for executing work, who employs the ablest foreman, the most competant workmen, who sees to it that every mechanical device in the way of tools and machinery is used that will save labor, who is the most careful in the management of his men—the one, in short, who is up in all these things, is the most able to bid close and the most likely to make money. The man, on the other hand, who knows so little about building as to want a system of estimating that is cast iron, and that shall relieve him from the necessity of knowing all the details of his business, is almost always going to be left in the contest, and in cases where he bids low enough to secure the work he is almost sure to lose money. We have no sympathy with "Jerry" building, with slighted contracts and with the various methods in vogue by which a building is made to appear better than it is, and owner and architect made satisfied with it, even though the value is not in it. Our remarks do not advocate business conducted upon such a plan. We are simply contrasting keen business management with the happy go-lucky, old-fashioned way of doing things. Manifestly there is no possibility of a system of estimating ever being invented that will save the necessity of personal familiarity with every item that enters into a building, whether of materials or labor, and of discriminating judgment. Success beyond this depends upon competent business management. Even if the builder knows his business to-day, there is no chance of his ceasing his exertion if he desires to keep up in the race. The knowledge of to-day is not sufficient for an estimate to be made 6 months or a year hence; and, accordingly, he must be constantly laying about him for new ideas, ever on the alert to take advantage of new methods and ready to make application of those novel plans constantly being put forth in every department of trade.

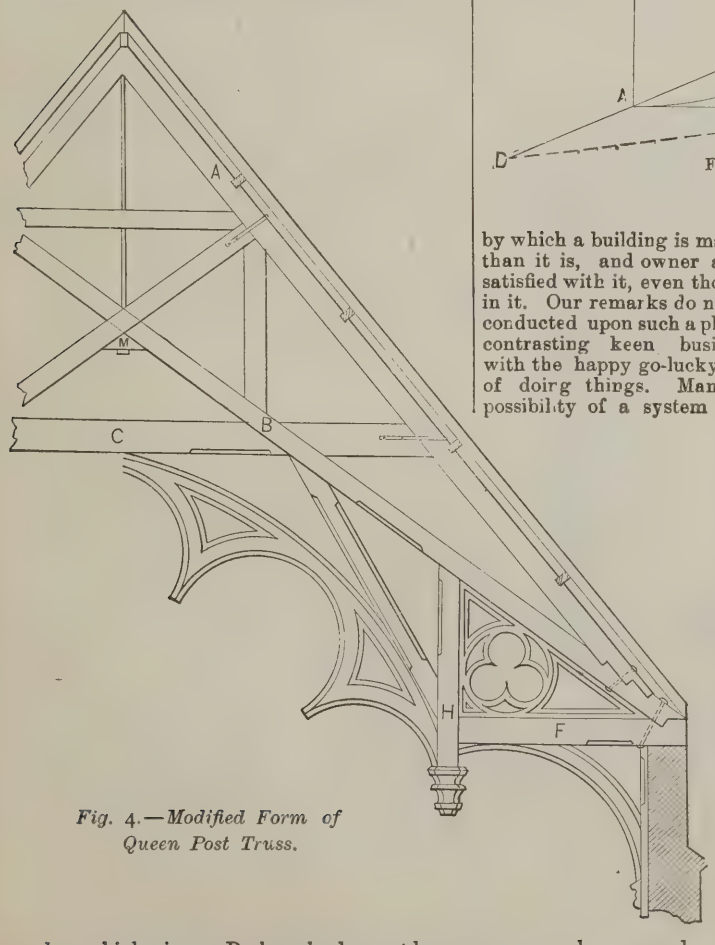


Fig. 4.—Modified Form of Queen Post Truss.

Rectification of Circular Arcs.

From C. J. M., *Oswego N. Y.*—A much simpler and shorter proof of "J. H.'s" graphical method of developing the circumference of a circle, published in *Carpentry and Building* for May, is the following: But first "J. H" neglects to say that the line $h\,o$ is drawn making an angle of 30° with $a\,b$, which is the case, however. Making the radius equal 1, $h\,b$ is the natural tangent of 30° (which may be found in almost any book of tables), equal to 0.57735; hence

$$a\,k = \sqrt{(2)^2 + (3 - 0.57735)^2} = 1.14533 - \pi\,R \text{ nearly.}$$

In the absence of a table of tangents $h\,b$ may be easily calculated, as:

$$o\,e = \sqrt{R^2 - \left(\tfrac{1}{2}R\right)^2}$$

$$\sqrt{R^2 - \left(\tfrac{1}{2}R\right)^2} : \tfrac{1}{2}R :: R : h\,b, \text{ hence}$$

$$h\,b = \frac{\tfrac{1}{2}R^2}{\sqrt{R^2 - \left(\tfrac{1}{2}R\right)^2}} \text{ again making } R = 1$$

$$h\,b = \frac{\tfrac{1}{2}}{\sqrt{\tfrac{3}{4}}} = \tfrac{1}{3}\sqrt{3} = 0.57735, \text{ value}$$

of natural tangent of 30°. In this connection the graphical constructions for the rectification of circular arcs and for laying off an arc equal to a given straight line, due to Rankine, may not be without interest if not already known to your readers.

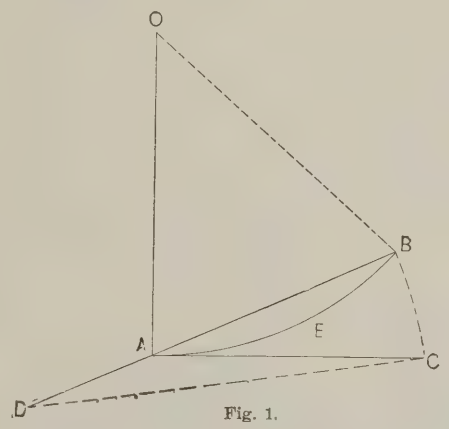


Fig. 1.

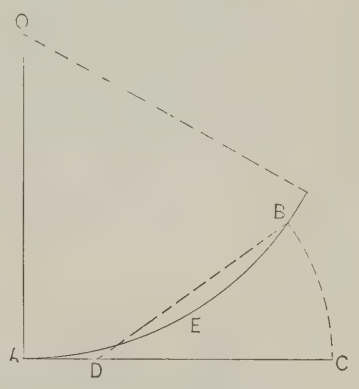


Fig. 2.

Rectification of Circular Arcs.

In Fig. 1, to lay off a straight line equal to arc A E B, draw chord A B and prolong it until A D equals one-half A B. From D as a center describe arc B C, cutting tangent A C in C; than A C equals arc A E B nearly. The angle A O B should not exceed 60°; if so it should be divided; the smaller this angle the more accurate the result.

In Fig. 2 let A C be the given straight line, its length to be laid off on arc A E B. Make A D equal one-fourth A C; from D as a center strike arc B C. Then A E B equals A C nearly. These rules are very simple and very convenient for many purposes.

Note.—It gives us pleasure to publish the above communication, as we are confident it will prove of interest to many of our readers. We presume that the trigonometrical terms will be puzzling to some, but if the letter incites any of our readers to study plane trigonometry, it will serve a most useful purpose. The method given for rectifying circular arcs is easily understood and requires no further explanation from us. The portion of the letter that refers to a previous communication from "J. H.," however, contains an error that calls for correction. The method itself is all right, but in reducing the expression

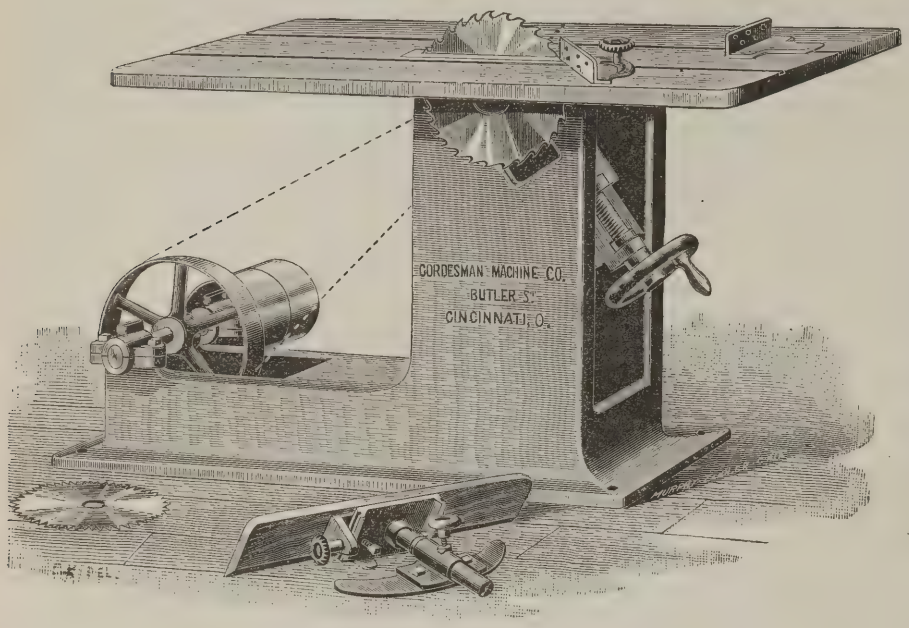
$$\sqrt{(2)^2 + (3 - 0.57735)^2}$$

our correspondent has, we presume, inadvertently set down the wrong figures. In his letter he makes the expression equal to 1.14533 or π R nearly, as he says This is manifestly wrong. It should be 3.14153. which our readers may deduce for themselves from the expression referred to.

NOVELTIES.

A New Dimension Saw.

The Cordesman Machine Company, Butler street, near Pearl, Cincinnati, Ohio, have recently introduced the dimension saw shown in Fig. 1 of the engravings. The cut shows their standard circular bench, designed for accurate and special work in pattern making, furniture working, molding and picture-frame factories and carriage establishments. Although the machine is new in the market, we are informed that it has already met with decided favor, and that the company have received a number of very flattering testimonials from those who have used it. The company claim that in this machine they have produced a perfect saw bench, embodying every important feature necessary for good work. The frame, with extensions and bearings which support the counter shaft, are cored out cast in one solid piece. Accordingly, a very substantial floor support is secured to the machine, giving it greater strength and rigidity than is possible where separate pieces of castings are employed. The table measures 2½ feet in width by 4 feet in length. It has grooved ways planed in it on each side of the saw, so that interchangeable cross-cut and miter fences can be used. The ripping fence can be angled to any bevel, and can also be adjusted to suit various widths of boards. All the fences can be removed in a moment's time. An opening, which is provided with a hard wood throat piece, has been cast in the table through which the saw extends. The throat piece is removable, so that groove and wabble saws, dado heads, &c., can be used. The mandrel runs in long boxes lined with genuine Babbitt metal. The frame carrying the mandrel and saw can be quickly raised and lowered by the screw and hand wheel at the front of the machine. It is fitted with an adjustable gib to the dove tailed ways on the inclined frame, which is bolted to the main frame and held at such an angle to the counter-shaft that the length of the belt is not varied when the position of the mandrel is changed.



Novelties.—Fig. 1.—Dimension Saw, Built by the Cordesman Machine Company, Cincinnati, Ohio.

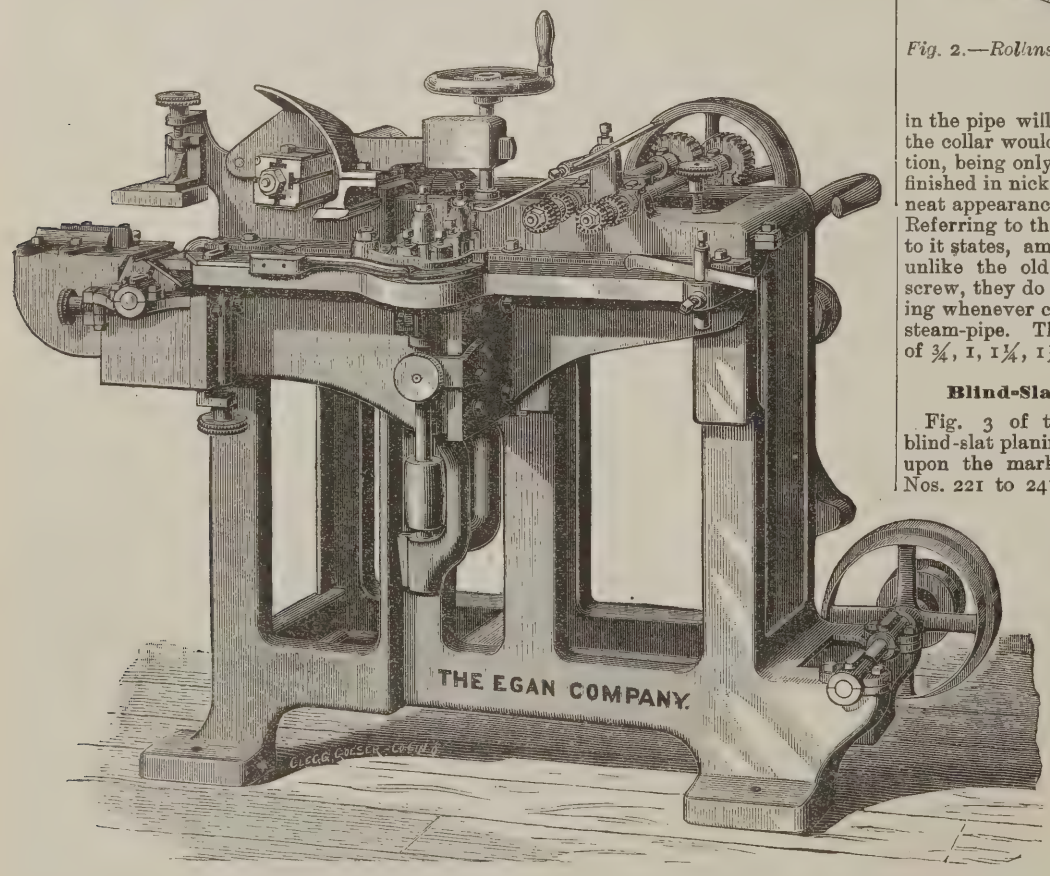


Fig. 3.—Blind Slat Planing Machine, Built by the Egan Company, Cincinnati, Ohio.

Rollins's Patent Self-Grip Ceiling Collar.

Mr. O. Chan. Wells, 76 John street, New York City, in the capacity of general agent for the United States and Canada, is putting on the market Rollins's Patent Self-Grip Ceiling Collars for steam pipes, a general view of which is shown in the accompanying illustration. The cut shows the general features of the collar, and also its construction, so that very little description is necessary to explain it to our readers. It may be stated, however, that the collar which has annular corrugations is stamped from sheet brass. Surrounding the hole are a number of projections or fingers, which grasp the steam-pipe when the latter is encircled by the collar. These fingers are made from the same piece of metal as the collar, and are bent slightly inward so as to form a sort of spring fastening, contracting and expanding with the pipe. It will be further understood that any slight rise or fall in the pipe will not injure the ceiling, for the collar would adjust itself to the variation, being only slipped on. The collars are finished in nickel and bronze, so as to give a neat appearance when placed on the ceiling. Referring to the device, a circular relating to it states, among other advantages, that, unlike the old cast-iron collars with set screw, they do not slip down from the ceiling whenever contraction takes place in the steam-pipe. The collars are made in sizes of ¾, 1, 1¼, 1½, and 2 inches in diameter.

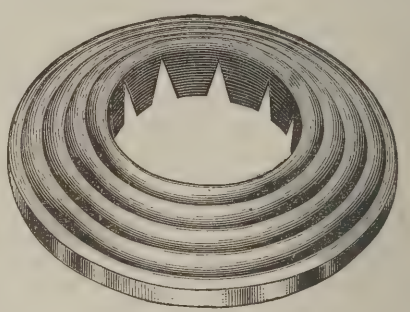


Fig. 2.—Rollins Patent Self Grip Collar for Steam Pipes.

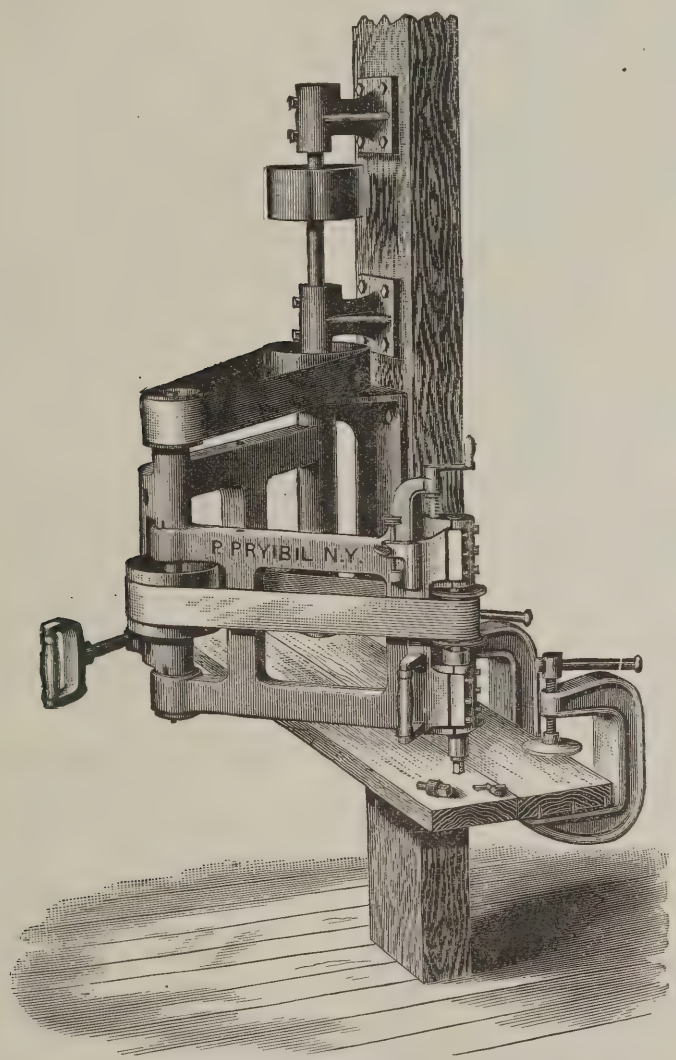
Blind-Slat Planing Machine.

Fig. 3 of the engravings represents a blind-slat planing machine that is being put upon the market by the Egan Company, Nos. 221 to 241 West Front street, Cincinnati. The machine is described as a four-sided machine—that is, it planes various kinds of blind slats on all four sides at one operation. The machine is claimed to possess many new points over other blind-slat planers. The makers state that it will not tear out or chip on cross-grained stuff, but makes perfectly smooth slats, free from waves or breaking out of edges. They assert, further, that the side cutters can be run as long as the plane bits without sharpening—something which has not heretofore been accomplished. The frame is cast in one piece, allowing for long belts for each cutter-head, and making a very solid, durable frame, capable of standing the hardest strain likely to be put upon it. The side heads are made of gun metal, and carry

three knives each. The side heads, it is stated, are placed in the machine in such a manner as to prevent undue wear on the knives when cutting the slat. The machine is also adapted for use for all kinds of light molding, door styles and work of that general class, making it specially desirable for mill and general work. Two changes of feed are provided.

String Routing Machine.

A form of stair builder's machines, denominated a string routing machine, has just been put upon the market by P. Pryibil, of Tenth avenue and Fortieth street, New York City. It is illustrated in Fig. 4 of the engravings. The machine is designed for letting in the risers and treads of steps. Two swinging arms are hinged to each other and to a bracket fastened to a post or wall. A dove-tailed cutter is carried at the end of the second arm, and is so arranged as to be moved freely in any direction by means of the two handles connected to the two arms. These handles are so placed that the operator is always able to apply his strength to the best advantage in feeding the cutter to the work. The arms are hollow or tubular in section, and, therefore, are light, yet strong. Owing to this fact, and the wide spread of the hinge bearings, the machine is very easily handled, and, at the same time, is very powerful and stiff. The spindle has a vertical adjustment to regulate the depth of cut, and is provided with an adjustable screw-stop. Only two forms of patterns are required in the use of the machine—one for heavy steps, and one for light. These are made by the user to conform to his practice, and are usually constructed of three thicknesses of hard wood, glued together with the grain crossing. Right and left strings are produced by laying the form one or the other side up. Different risers and treads depend upon the marking off, and not on the forms, as the latter will fit all runs. As the part which runs against the form does not revolve, the latter need not be lined with metal



Novelties.—Fig. 4.—String Routing Machine.

New Door Clamp.

E. C. Stearns & Co., of Syracuse, N. Y., are putting upon the market the new door clamp shown in Fig. 5 of the engravings. Of the costly tools required by carpenters and woodworkers the door clamp has been a conspicuous example. Those who have had occasion to buy articles of this kind, and who have, in view of the price generally demanded for them, sought something cheaper, will be interested in the article here illustrated. The clamps are mounted on maplewood 1¼ inches x 1½ inches in two lengths 3 and 4 feet respectively. The loose jaw is supplied with a spring that holds it at any point required, and is very easily and simply operated. The stationary jaw at the end of the bar is held in place by a neatly arranged screw. This jaw has a malleable iron thumb-screw with ball and socket joint, making an adjustable washer. This tool would seem to be one to command attention from the trade in general.

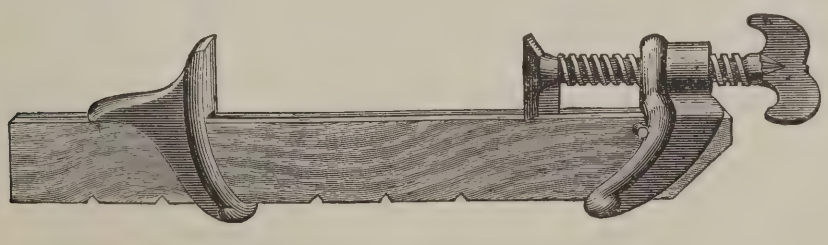


Fig. 5.—E. C. Stearns & Co.'s New Door Clamp.

The House Liquid Door Check.

This article is put on the market by E. E. Graves, Bridgeport, Conn., and its special features are shown in the illustrations given below, Fig. 6 representing its position when the door is open, and Fig. 7 its position when the door is closed. It will thus be observed that the arm A is placed on the door frame in such a position that it comes in contact with the roller connected with the piston of the door check in such a way as to force in the piston in the operation of closing the door. The check itself is attached to the door, as shown, and contains oil, which, by the movement of the piston, is forced in the operation of closing the door through a tube connecting the lower with the upper portion of the cylinder, and by this expenditure of force the closing of the door is checked. There is, it will be observed, a regulating rod C, which is intended to modifying the operation of the check. If the door closes too rapidly the regulating rod is screwed down, and if too

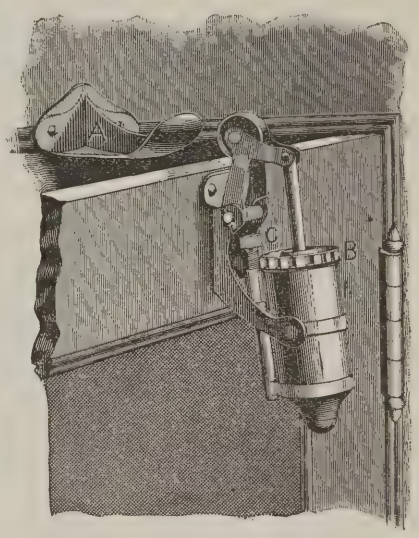


Fig. 6.—Position of House Liquid Door Check when Door is Open.

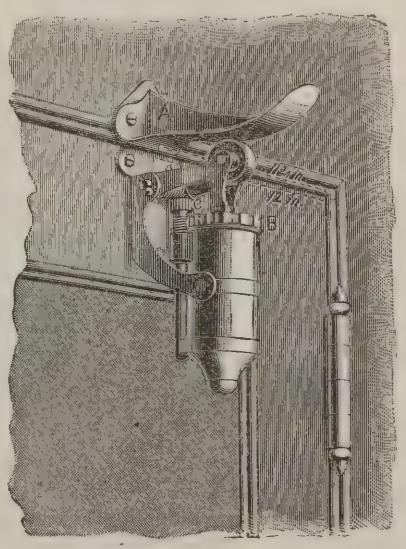
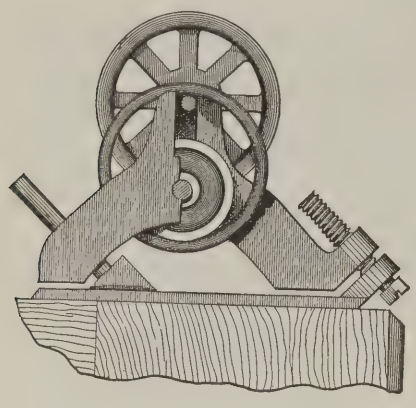


Fig. 7.—Position of House Liquid Door Check when Door is Closed.

slowly it is turned up, thus permitting a more or less free movement of the oil, as may be desired. These checks are made of steel and white metal, with all parts interchangeable. Attention is called by the manufacturer to the fact that, as the working parts are submerged in oil, there can be little wear, and that they will last for years. The checks are intended especially for use on screen or inside doors where they will not be exposed to extreme cold. The ease with which they are applied to the door is also alluded to.

Endless Anti-Friction Door Hanger.

Messrs. Bullard & Gormley, Chicago, Ill., have just got ready for the market a door hanger which they pronounce the cheapest



Novelties.—Fig. 8.—Endless Anti-Friction Door Hanger.

in the world. Fig. 9 of the engravings represents the device as applied to a door, and Fig. 8 shows the parts of which it is composed. By inspection of the cuts it will be seen that the hanger sustains the door from the axle of the wheel by a ring, giving a continuous run of the wheels and keeping them always in the same relative position to the door, and thus, as the makers say, overcoming the weak points of horizontal anti-friction hangers, where the wheels travel back and forth from one end to the other, thereby constantly changing the strain on the screws and causing them to work loose. One of the difficulties encountered with the ordinary style of hanger is, that the yokes are out of level; and, accordingly, the doors out of plumb. In this case the travel of the wheels is not limited, and the ring serves the useful purpose of overcoming friction and carrying the load from the hanger to the axle of the wheel. The device is very simple and permits of an easy adjustment and ready attachment. The hanger runs between parallel rails, and the upper wheels are flanged, as clearly shown in the engraving.

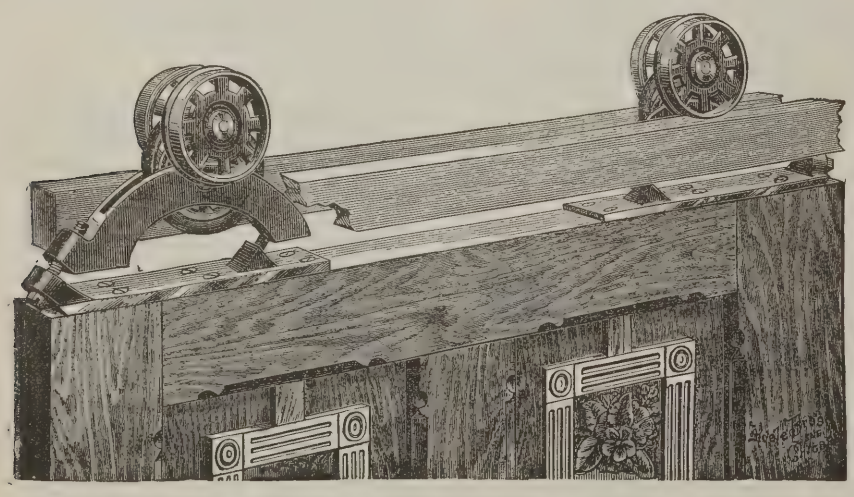


Fig. 9.—Endless Anti-Friction Door Hanger Attached to Door.

New Draw-Knife Chamferer,

J. H. Hoague & Co., Chicopee, Mass., are putting on the market the Draw-Knife Chamferer represented in Fig. 10 of the illustrations. The manner in which it is

Fig. 10.—Draw-Knife Chamferer.

fastened to the blade is indicated, and it will be observed that thus attached there is no liability of its injuring the edge. It will be perceived that it has an adjusting screw on the back, by means of which it can be adjusted with exactness. In use the mechanic can set the adjusting screw to the width of chamfer he desires to have before fastening the same to the blade. This chamferer is made in three sizes, 1¼, 1½ and 1¾. When wanted for knives thinner than the common size, ¼ inch, it should be so stated when ordering. The manufacturers allude to the large sale of the chamferer they have previously been making, and call attention to the important advantages possessed by the one here described, which they expect will meet the requirements of the trade.

Indurated Fibre Goods.

Most of our readers are familiar with pails, wash-basins and other utensils made of indurated fibre; and, yet, perhaps they are scarcely accquainted with the nature of the goods, or aware of the wide application that the material has in the economy of every-day life. The Union Indurated Fibre Company, at their factory at Mechanicville, N. Y., are now manufacturing tubes or pipes from wood fibre, by a peculiar process controlled by patents. We are informed that they have arranged with the Board of Electrical Control, of New York City, which has charge of putting underground all wires for electric light, telephone and telegraphic purposes, for a large quantity of these tubes. They are at present negotiating with one of the largest natural gas companies, for an extensive supply of pipes made of the same material. These examples illustrate the diversity of uses to which pipe of this kind may be put. The variety of interest affected by the invention and introduction of indurated fibre is widening constantly, and the adaptability of the material seems almost unlimited. The claims made for the pipe are very broad. Tests made in connection with the Board of Electrical control, or the Subway Commission, showed the material to have a tensile strength of about 100 pounds to the inch. A 2½-inch pipe will stand a pressure of from 80 to 100 pounds to the square inch. Tubes made of this material are light and strong, and have the advantage over iron of cheapness. At present they are made in lengths of about 5 feet, are threaded with the standard pipe thread, so that they can be connected with iron pipe. Two and one half inches is the smallest size now made. The company inform us that they will soon be in shape to fill all orders for sizes from 2 inches up.

Sand in Plaster.

G. R. BURNELL.

In Paris the mode of using plaster is to employ it pure and free from mixture. The very low price at which it is sold and the comparatively high price of sand dispense with the motives of economy which render mixtures almost indispensable in our case. While the practice in France is to use plaster pure, I am disposed to think that the mixture of sand, so far from being prejudicial, is even desirable, if confined within reasonable limits. We find that in reassuming the state of hydrated sulphate of lime the plaster goes through an imperfect crystallization, and this action is accompanied by a singular rearrangement of the molecules. This causes the plaster to swell when used alone, and to such an extent that it is impossible even to finish a ceiling close up to a wall at once. Now, the introduction of a body so full of inequalities as the coarse, sharp sands must afford room for the free action of this expansion, and at the same time the facets of the sand must offer, as it were, nuclei which cannot but be favorable to the crystallization. It is doubtlessly on these principles that we can explain the superiority of the plaster containing wood breeze, which does become harder than the purer plasters if used alone. Too large a proportion of sand should be avoided, but very fair work can be executed even with a mixture in the proportions of two of sand and one of plaster. Under any circumstances the finishing coat should be pure. Subsequent experience will decide whether the use of two materials of this kind does not expose the work to unequal contractions, likely to cause fissures or cracks.

Lightning-Rods for Tall Chimneys.

M. Faraday, writing on this subject in reply to a correspondent, says:

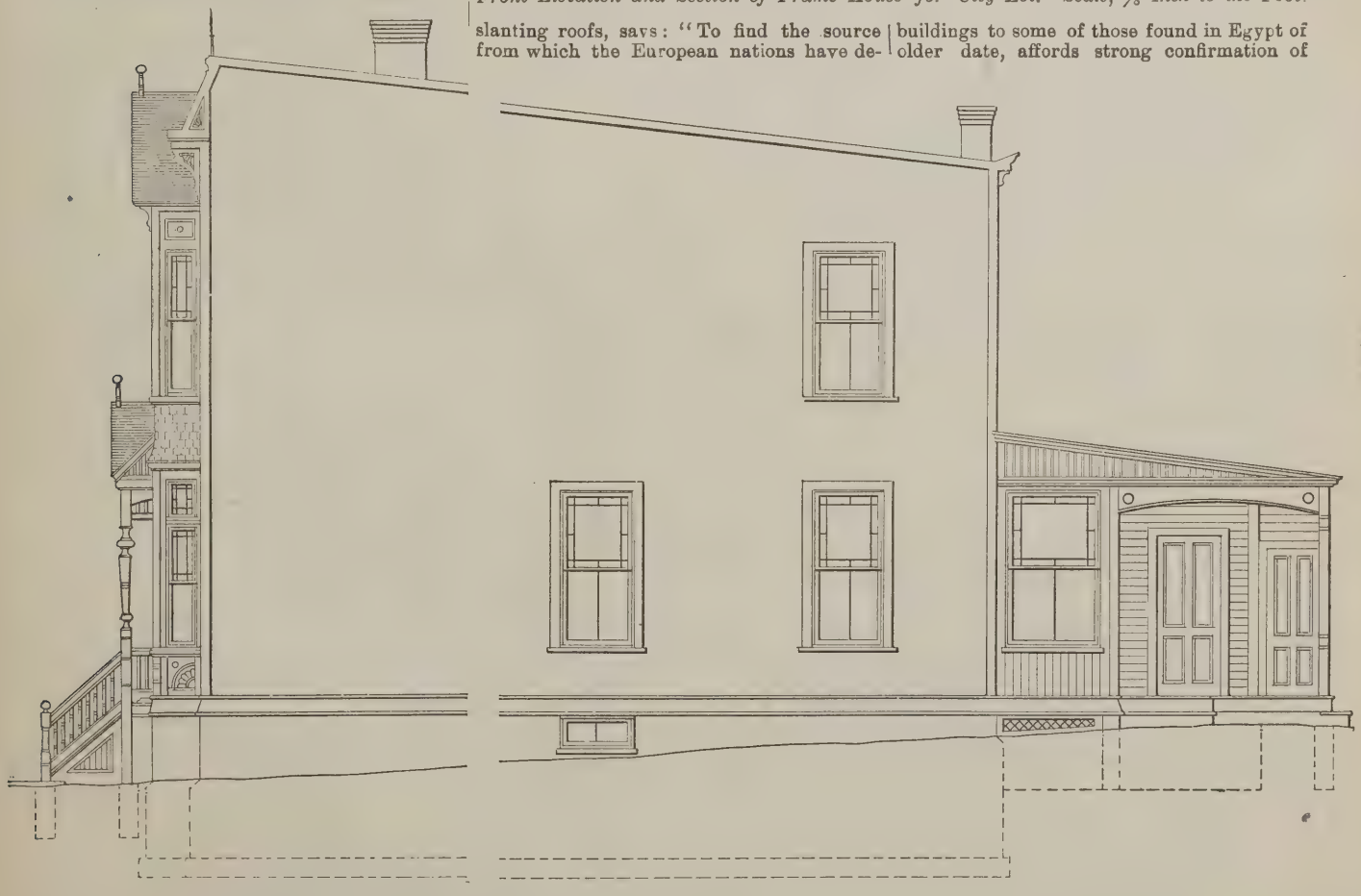
The conductor should be of ½-inch copper rod, and should rise above the top of the chimney by a quantity equal to the width of the chimney at the top. The lengths of rod should be well joined metallically to each other, and this is perhaps best done by screwing the ends into a copper socket. The connection at the bottom should be good; if there are any pump-pipes at hand going into a well they would be useful in that respect. As respects electrical conduction, no advantage is gained by expanding the rod horizontally into a strap or tube—surface does nothing; the solid section is the essential element. There is no occasion of insulation (of the conductor) for this reason. A flash of lightning has an intensity that enables it to break through many hundred yards (perhaps miles) of air, and therefore an insulation of 6 inches or 1 foot in length could have no power in preventing its lead to the brickwork, supposing that the conductor were not able to carry it away. Again, 6 inches or 1 foot is so little that it is equivalent almost to nothing. A very feeble electricity could break through that barrier, and a flash that could not break through 5 or 10 feet could do no harm to the chimney. A very great point is to have no insulated masses of metal. If, therefore, hoops are put round the chimney each should be connected metallically with the conductor, otherwise a flash might strike a hoop at a corner on the opposite side to the conductor, and then on the other side in passing to the conductor, from the nearest part of the hoop, there might be an explosion, and the chimney injured there or even broken through. Again, no rods or ties of metal should be wrought into the chimney parallel to its length, and, therefore, to the conductor, and then to be left unconnected with it. The rod may be close along the brick or stone; it makes no difference. There will be no need of a rod on each side of the building, but let

the cast-iron hoop and the others you speak of be connected with the rod, and it will be in those places, at least, as if there were rods on every side of the chimney. A ¾ rod is better than a ½ inch, and, except for the expense, I like it better. But a ½ inch has never yet failed. A rod at Coutt's brewery has been put up 1½ inches in diameter; but they did not mind expense. The Nelson Column, in London, has a ½-inch rod—¾ is better. I do not know of any case of harm from hoop iron inclosed in the building, but if not in connection with the conductor I should not like it; even then it might cause harm if the lightning took the end furthest from the conductor.

Frame House for a City Lot.

The accompanying front and side elevations, section, floor plans and details represent a frame house adapted to be built on an ordinary city lot. The building in question was designed by Charles E. Hebberd, architect, No. 62 Broad street, New York, and represents one of a number that have been built in the suburbs of Brooklyn and at other points near New York. In connection with another design by the same author, presented in our columns a short time since, it shows a pleasing variety in details that may be employed in buildings of this class. Among the details submitted herewith will be noticed features employed in the former design above referred to. By inspection of the floor plans it will be seen that the first floor provides the conventional parlor, back of which is the library, and back of this in turn is the dining-room. The latter room is lighted from the side, as is shown by the side elevation. The kitchen is in an extension, and is flanked by a porch, and between the porch and the dining-room is located a conservatory, all of which will be understood by reference to the side elevation. The second floor provides two good-sized bedrooms and two small bedrooms, together with bathroom and closet space. The bathroom is lighted and ventilated from the roof.

Front Elevation and Section of Frame House for City Lot.—Scale, ⅛ Inch to the Foot.



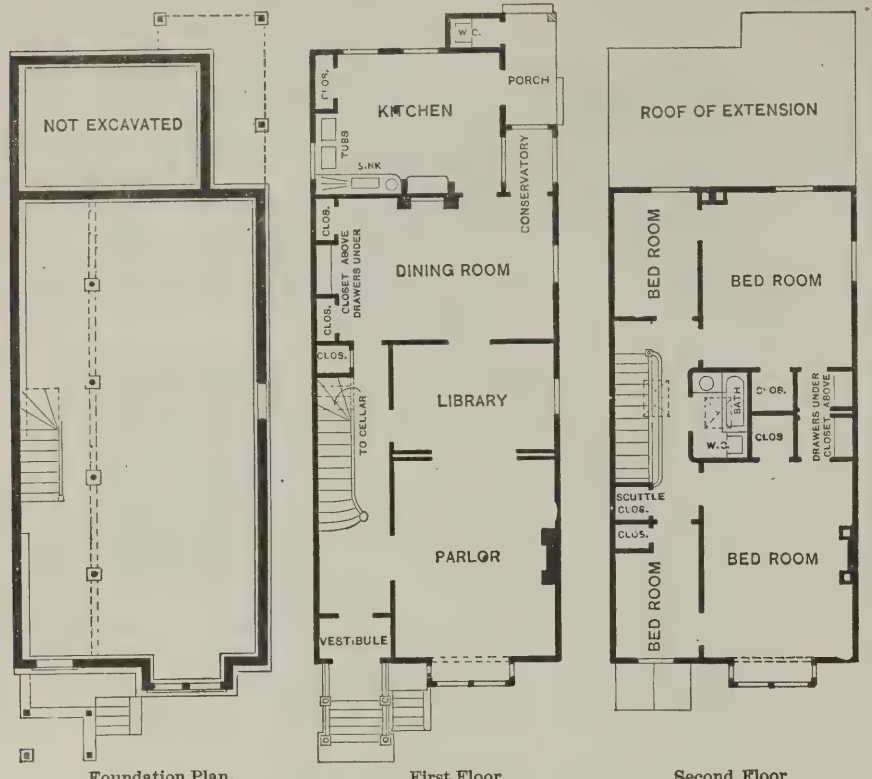
Side Elevation of Frame House for City Lot, Designed by Charles E. Hebberd.—Scale, ⅛ Inch to the Foot.

There is an attic over the front part of the house which provides good ventilation and avoids the excessive heat occurring immediately under the roof of ordinary residences.

Slanting Roofs.

A writer in a recent issue of the *Popular Science Monthly*, in tracing the origin of slanting roofs, says: "To find the source from which the European nations have derived the art of building in stone, we must look to the land of the Pharaohs. From Egypt the craft passed to Greece, and from the Greeks it was taken up by the Romans, to be by them disseminated through the north and west of Europe in the process of colonization. The similarity, in regard to constructive parts of the ancient Greek buildings to some of those found in Egypt of older date, affords strong confirmation of the tradition that the Greeks borrowed the art from the Egyptians. The Greeks, however, in the adoption of it, added a new feature, the pediment, and the reason for

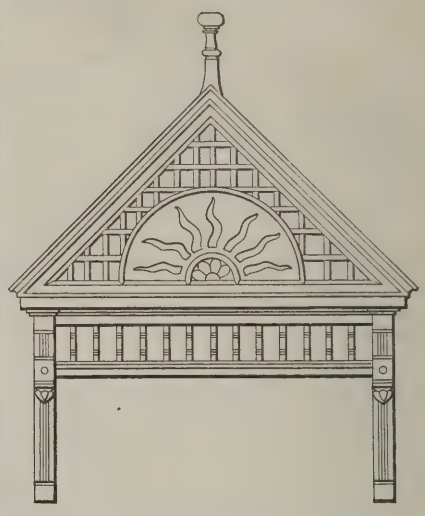
this addition is easy to find. Egypt is practically rainless. All the protection from the climate required in a palace or temple in such a country is shelter from the sun by day and from the cold by night, and for this a flat roof, supported by walls or pillars, with architraves, is quite sufficient; but when, as in all European countries, rain has to be taken into account, a slanting roof becomes a necessity. The Greeks, with their eye for symmetry, provided for this by forming the roof with a central ridge, as an obtuse angle, from which it sloped down equally on either side. The triangular space that formed at the end of the building above the architrave was occupied by the pediment, and this part of the facade, which owed its birth to the exigencies of the climate, was thenceforth regarded as so essential to the completeness of the work, that it was said that if a temple were to be erected in the celestial regions, where rain would not be possible, the pediment could not be omitted."



Foundation Plan. First Floor. Second Floor.

Floor Plans of House by Charles E. Hebberd.—Scale, $\frac{1}{16}$ Inch to the Foot.

Detail of Bay Window of House Published on Page 151, Carpentry and Building, for August.—Scale, ⅜ Inch to the Foot.

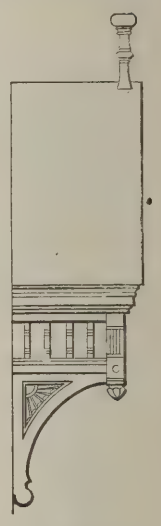


Front Elevation of Door Hood of House on Page 151, August Issue.—Scale, ⅜ Inch to the Foot.

Planning of Rooms.

W. HOSKING.

Whatever the length of a room may be, it will not be disagreeably proportioned if its hight and breadth are the same; and if, the length may be limited, once and a half the breadth is the most pleasing. Galleries, of course, will be much longer than that proportion, and the corridors will necessarily be narrower than they are high. Entrance-halls should be cubical, regularly polygonal, or circular. Access should be given to a room by the end; it should be lighted on one side, and the fireplace may be at the other end, or on the other side; if the former, there should be two doors, or one and the appearance of another, that the fireplace may not be immediately opposite a door. Many things, however, from localities and otherwise, constantly occur to make it absolutely impossible to attend to such suggestions as these. In halls and saloons not commanding a pleasing view, the windows may be advantageously placed above the usual level, for agreeable effect, for light, and for ventilation. In rooms lighted from above, as the Pantheon in Rome is, a columnar ordinance may be judiciously adapted, but otherwise columns and their accessories can seldom be well disposed internally.

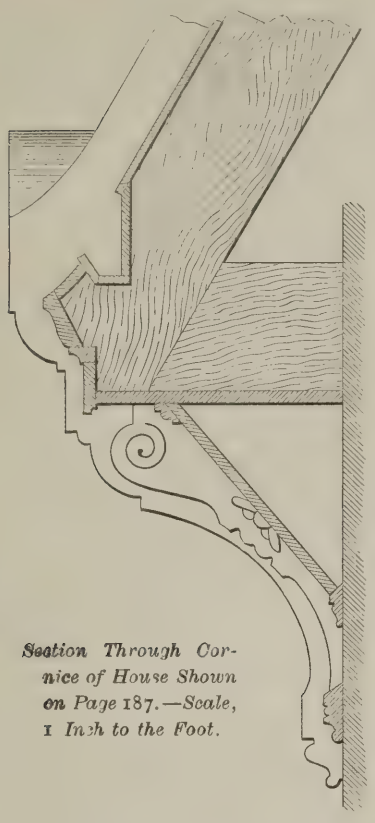


Side Elevation.—Scale, ⅜ Inch to the Foot.

Lath or Laths?

One of our Western architectural exchanges, discussing the form of the word lath, or rather, whether the plural is lath or laths, says: "Most of the newspapers print it in the plural. At the East it is commonly called laths. In the West one scarcely ever hears a lumberman talking about laths; simple lath in a collective sense is good enough for the wild and untutored Western

merchant. Webster's dictionary says that laths is right, and that is sufficient for the Eastern lumbermen who have graduated from college or high school to the lumber yard. Webster has doubtless decided that if it is right to say boards, pickets, and shingles, it is the proper thing to say laths



Section Through Cornice of House Shown on Page 187.—Scale, 1 Inch to the Foot.

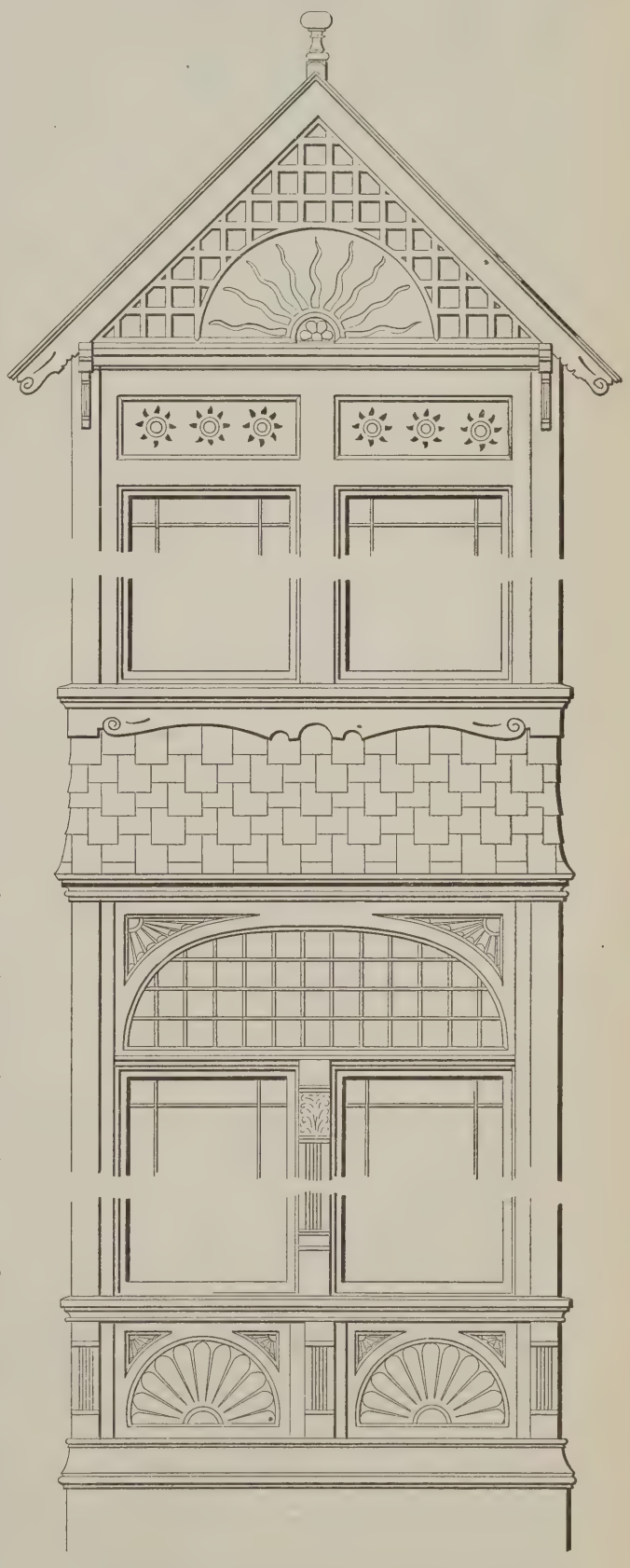
Detail of Stoop of House on Page 187.—Scale, ⅜ Inch to the Foot.

By the same rule corn should be corns, because beans are beans, and trout should be trouts. Words are as usage makes them. The *Lumberman* says lath, thus taking the liberty to disagree from the dictionary, choosing rather to conform to common sense and side with the great mass of men who handle the stuff."

The Spirit Level.

E. STEVENSON.

There unfortunately exists a great deal of conflicting evidence regarding the true inventors of the different parts of the spirit level. Indeed there are hardly two authorities who agree upon the subject. The original form seems to have been that of a plummet, and is described as *instrumentum quo, plumbo à filo et gnomone pendente, rectio sive obliquitas operis perpenditur.* The great Huygens appears to have been the first to apply the telescope to a level of his, which was constructed on the principle of a plummet. The honor of having first applied the air-bubble to the determination of horizontality seems to be due to that universal genius, Dr. Hooke. From all that I can gather, it appears that his invention must have been made subsequent to March 25, 1674, and prior to the year 1675, as, in his "Attempt to Prove the Motion of the Earth by Observations," by date March 25, 1674, he describes a new method of stiling the plummet by immersion in water. In his "Animadversions," published also in 1674, after fully describing his invention of the air bubble confined in a tube, he speaks of its peculiar advantage and great delicacy of movement, and remarks: "This can hardly be performed by the ordinary way of plummets, without hanging from a vast hight, which is not practically to be performed without almost infinite trouble, expense and difficulty," &c. Hutton, in his "Mathematical Dictionary," remarks that the application of the air-bubble to the level "is said to be due to M. Thevenot," but with what justice I cannot say, having been unable to meet with any reference to this instrument in the writings of that author. Thevenot was born in 1621, and he died in 1692. I have been unable to discover who was the inventor of the circular level, which I imagined had been of recent date; but Switzer, at page 91 of his "Treatise on Water Works," which was published in 1734, remarks that the circular level was then employed in constructing the surveying instrument called a plane table. Herschel says the cross-hair, which gives so much accuracy to all astronomical as well as leveling instruments, was the invention of Gascoigne, a young Englishmann, who used it in 1640. He was killed at the age of 23 at the battle of Marston Moor. M. Le Bion appears to have been the first to conjoin the telescope of Huygens with the air-bubble of Dr. Hooke; and this must have been subsequent to the year 1684, as such an instrument is not shown in De La Hire's addition of "Picard's Treatise on Levelling." But it was not till Sisson's improvements that the level could be considered as in any way an accurate or philosophic instrument. All that were made previously to his time were course instruments, adjusted by a ball and socket, and in other respects resembling the common perambulatory survey-level, which, from the nature of the construction, can be leveled in only one direction, and cannot be reversed or moved even in the slightest degree, with-



Detail of Bay Window of House, p. 187.—Scale, ⅜ In. to Foot.

out requiring readjustment. Sisson may therefore be considered as the inventor of the instrument in common use. The main feature in his improvements was the introduction of the four screws called the parallel plate-screws. I have been unable to find out the date of Sisson's improvement, and, indeed, the only notice I can find of him is the following in Switzer's "System of Waterworks": "The invention" (alluding to the instrument with parallel plate-screws) "as I take it (for I am not as yet well acquainted with that gentleman), of William Sisson, at the corner of Beaufort buildings, in the Strand." Since the time of Sisson, the celebrated Ramsden introduced a tangent-screw and clamp, for moving the instrument with accuracy through small distances in an azimuthal direction. Messrs. Troughton & Simms also made several improvements in the arrangement of the various parts of the instrument; and Mr. Gravatt added a cross bubble for facilitating the rough setting of the instrument—or that adjustment which is made with the legs of the tripod; and an enlargement of the diameter of the object-glass, so as, by the admission of a greater number of rays of light, to allow of the telescope being shortened, without impairing its optical powers.

TRADE NOTES.

THE CORDESMAN MACHINE COMPANY, of Cincinnati, Ohio, send us copies of testimonials which they have recently received from the Edgefield and Nashville Mfg. Company, of Nashville, Tenn., and Cheshire & Steadman, of Cincinnati, concerning their satisfaction with the Dimension Saws which they purchased not long since. The letters speak in very cordial terms of the satisfaction which the writers experience with the machines they have bought. They are submitted by the Cordesman Machine Company as specimens of what they have received since this new machine has been under trial.

OUR READERS, who are already well acquainted with some of the special tools which L. S. Starrett, of Athol, Mass., has been putting upon the market for some years past, will be interested in learning that he has recently purchased the patents, machinery and entire stock of Charles B. Fay, of Springfield, manufacturer of the Fay patent caliper and the Yankee caliper and dividers, and proposes to consolidate the business with his old establishment. Athol seems to have a national reputation as a manufacturing center for patent articles, and this acquisition will certainly add luster to its fame.

THE RICHMOND WEATHER STRIP COMPANY inform us that they have recently closed a contract with the Pennsylvania Railroad Company for the use of their improved car-door weather strip on all the passenger coaches on the main line and branches of the company and on its leased roads. The original strip manufactured by this company is also having a large sale through the country. We understand that the sales during 1886 reached over 20,000 sets.

AUTOMATIC FIRE SPRIKLERS are described in a text book compiled by the Edward Barr Company, Limited, No. 78 John street, New York. These sprinklers are specially interesting to manufacturers, to mill owners and fire insurance companies. The frontispiece shows a section of building fitted with the Gray system of sprinklers. Various diagrams and illustrations through the pamphlet show different plans and special instruction to adapt the sprinklers to places in which they are to be used. A long list of names of those who are using the Gray sprinkler head is appended.

THE UNITED STATES GUTTA PERCHA PAINT COMPANY, No. 131 Mathewson street, Providence, R. I., direct our attention to some particulars with reference to the ready-made paints which they are supplying that are of more than passing interest to our readers. They head their letter "Facts Worth Remembering," and say that every person who gives the subject any thought will readily admit that it is impossible to use any kind of paint until it is well mixed. Further, it is impossible to mix the paint by hand as thoroughly as can be done by machinery. If then the materials used in a ready-mixed paint are the same as, or are equal in quality to those used by first-class painters, who prepare their own material, then it is fair to claim that the ready-made paint is the better of the two, simply because it is better prepared. They then refer to the character of the paint which they are furnishing, and state that it is in liquid form ready for the brush, and is made of pure linseed oil and pure white lead, with gutta percha and some other materials which combine to give it the high quality which has made its reputation and which adapts it for use for both inside and outside work.

THE SLATE BUSINESS in Vermont and New York, according to a recent issue of the Rutland *Herald*, has been better this season than for many years. The supply of roofing slate, though larger than ever before, has not been sufficient to fill all orders promptly. New quarries are being opened constantly, and several new enterprises have been inaugurated quite recently. Our exchange says, further, that slate is becoming an article of more general use every day, and is being introduced with much favor in new sections of this and other countries, so that the demand is constantly increasing, and growing even faster than manufacturers can supply the market. A short time ago the manufacturers of sea-green slate had an account taken of all the slates of that color and quality that were on the banks at the time. It resulted in showing 2300 squares at the different sea-green quarries in Poultney, Pawlet, and Wells. It is estimated that the output of sea-green slate in the region named is from 12,000 to 15,000 squares per month. With reference to the market, our exchange asserts that it opened this spring with prices advanced from the ruling figure of last year. However, owing to the cutting of rates, slate had brought but a small margin above the prices of last year. The shipping has been accomplished, however, with more satisfaction than ever before. The large manufacturers and dealers have combined together, and have brought about such a change in the management and control of the slate trade that they are able to regulate sales and prices in a satisfactory manner. In concluding the article from which we have been quoting, the *Herald* refers to Auld & Conger, Cleveland, Ohio, with whom our readers are acquainted, and who have for many years been extensive operators in slate in the region named. This firm, we learn, have recently purchased the quarry owned and operated by Owen J. Davies, deceased. This, we are informed, gives them the entire control, with a single exception, of all the slate produced from the celebrated Mammoth sea-green vein, being nine quarries in all. This is considered the finest bed of sea-green slate in this country. The product is asserted to be entirely free from sulphur, knots and impurities. The same firm a short time since contracted for the entire production of a large quarry adjoining the old Bangor Company, at Bangor, Pa. Ohio occupies a position in the front in the consumption of slate. There are more roofing slates used in Ohio each year than in any other three States of the Union. This condition of the Ohio slate trade is undoubtedly largely due to the efforts of the firm above named who have devoted their energies to this line of trade for 15 years past.

A NEW PAPER, the first number of which made its appearance early in July, is entitled the *Universal Tinker and Amateur's Assistant*. It is issued by Hodgson & Bertrand, New York. It is described as a journal for amateur workers, men or women, and it is to be published monthly. The editors have entered upon a wide and important field, and we have no doubt that they will be able to fill it acceptably.

IN ANOTHER PART of this issue Charles A. Strelinger & Co., of Detroit, present a number of testimonials relating to some of the goods which they have recently sent out. What they have to say is arranged under the suggestive heading that "The Proof of the Pudding is Chewing the String."

THE RAYMOND FURNACE AND MFG. COMPANY, with salesroom at 76 Beekman street, New York, and manufactory at South Norwalk, Conn., have issued a new catalogue of heating apparatus. Steam and hot water systems are shown, and also each of these in combination with hot air. The boilers represented are made of steel, and wrought or cast iron according to circumstances. The catalogue is amply illustrated and is of a character to be of interest to builders and architects in general.

KNISELY & MILLER, Nos. 129 and 131 South Clinton street, Chicago, direct attention in another part of this issue to their slate and tin roofing, corrugated iron for roofing and siding purposes, Hayes's skylights, corrugated conductor-pipe, and a general line of galvanized iron cornices.

THE ACADEMY OF ARCHITECTURE AND BUILDING is the name of an institution conducted by H. Maack, No. 3066 South 9th street, St. Louis, Mo. According to the prospectus for the present year a five months' winter term commences November 1.

THE VENETIAN BLIND COMPANY, Burlington, Vt., manufacture Hill's Patent Inside Sliding Blind, also English and American venetian blinds. They have a 36 page illustrated catalogue, which they are sending to all applicants.

THE J. F. PEASE FURNACE COMPANY, of Syracuse, N. Y., and Toronto, Ont., with branch offices in Chicago, Boston and New York city, announce a new 72-page catalogue, which is mailed free on application.

J. B. SHANNON & SONS, 1020 Market street, Philadelphia, announce to carpenters and the trade generally an illustrated catalogue containing upward of 200 designs of building hardware. This book is, we understand, mailed to any address upon receipt of postage.

ONE MILLION CARPENTERS are perhaps more than there are in the United States, and yet Gay & Parsons, of Augusta, Me., have no hesitation in advertising for that number of mechanics to use their double action ratchet screw-drivers. They want every one to send for circular and price list.

MERCHANT & CO., of Philadelphia, are directing attention to important changes which they are introducing in the tin-plate trade, particularly with reference to roofing plates. In another part of this issue we publish a card in which it is announced that hereafter the boxes of their two well known brands of roofing plates will be marked with the average net weight of the plates. They present a statement of what these weights will be. They also direct attention to the fact that no wasters—by which is meant defective sheets—will be imported of either of these plates. These facts are of interest to builders who desire to secure good roofs at reasonable prices for the buildings in their charge.

WE HAVE RECEIVED from the State Board of Health, of Massachusetts, the eighteenth annual report of that body. It is a volume of 366 pages devoted to health statistics, tabulated in the usual form, and, in some cases, illustrated with diagrams. A considerable part of the book is devoted to a manual for the use of boards of health in the Commonwealth of Massachusetts, and containing the statutes relating to health affairs and the decisions of the Supreme Court of Massachusetts on the same.

THE BERGER MFG. COMPANY, of Canton, Ohio, have lately put upon the market a new Ventilator known as the Berger. We understand that the new article has met with a flattering reception in the short time that it has been before the public, not less than 150 of them having been put up within a very few weeks. The device is said to be giving entire satisfaction. We understand that their trade in Corrugated Conductors, Eave Troughs and Hangers is much larger the present season than ever before.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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VOLUME IX. NEW YORK, OCTOBER, 1887. NUMBER 10

NOTES AND COMMENTS.

THE Editor of *Carpentry and Building* is desirous of corresponding with architects, designers and draftsmen who have house studies or odd drawings which are appropriate for the columns of this journal. We have no objection to buildings that have already been erected, and can use copy in almost any shape in which it is convenient for the owners to furnish it. We seldom reproduce drawings, but instead engrave direct. Where special studies are prepared for use in our columns we are ready to make special arrangements.

A FEATURE of the month of September was the great parade at the centennial celebration at Philadelphia. All the building trades took part in the demonstration, and a number of unique and interesting features were to be observed in line. The display of the master builders was elaborate and one of the finest made, illustrating the progress of the building trades. The two great trunks of trees on trucks that led this exhibit were with difficulty forced through the crowds, but when they came they excited wonder that such logs could be handled. The process of building a house and woodworking by hand a century ago were sharply contrasted with those of to-day. The woodworkers were followed by the stonemasons, beginning with the quarrymen. Hundreds of masons marched briskly to quick music, for the two big logs had opened a better passageway for the line. Then came the brickmakers, and, as they stretched along, the view down Broad street was remarkable. The dense crowds of people filled almost all the street, with a narrow line of white-hatted brick-makers stringing through it, their flags and banners streaming for several squares below. The brown hatted clay-mixers were among the white hats, with a stalwart crew of the colored laborers bringing up the rear. Then came the process of brick-making—old and new—in full illustration, the carrier boys of the brickyards dangling their legs over the edge of the floats. The brick machines were there in sharp contrast with the slow and uncouth processes of 1787. Then came hod-carriers, led by a tableau of two nimble fellows, ready to mount the ladder—a fine body of colored men. A maze of terra cotta, of fire-brick, of pottery, kilns, retorts, and all in operation, were followed by the roofers, who showed the old thatched roof and the modern roofing, some of the constructions in metal-work being of grand design and completeness. The plumbers followed, the old log-water conduits and ancient, dilapidated bathtub being contrasted with the modern water-main of vast diameter and the latest plumbing, artistically constructed. The Saw and Planing-Mill Association, with their machinery and their completed windows and shutters, were followed by a lathed house ready for plastering. Then came the plasterers in white overalls and hats, ready for work and carrying their tools. The lamp and gas fixtures and sheet metal workers were out in full, with their sledge-hammers and shears, and displaying most elaborate work—a grand cross surmounting the globe, the lion rampant, and, to make a sharp contrast, the old shingled church tower half rotting away, with its rude weather vane, compared with the gracefully tapering modern spire with its bright metal covering and the elaborate Louvre dome ready to surmount a palatial villa. The old worm and the new metal fences were contrasted, and during the frequent halts, to show the resonant metal to even better advantage, a cornet player on one of the floats gave fine airs for the delectation of the delighted crowds. The painters followed with the significant announcement that "In 1787 all paints were imported;" but afterward some paint makers were also imported, and the results were shown in the steam mill grinding chrome yellow and in the other evidences of progress—the old paint shop and the new, and the moving mass of painters marching in a solid body behind. An ancient log house, with the wolf skin tacked on the door and the latch string hanging out, was followed by the Carpenters' and Joiners' Trade Society, who made the impressive announcements "Our Brotherhood is 42,000 Strong," and "We Wish Only Nine Hours a Day," and, further, that "The Trade Union Men are Loyal to American Industries." The Southern log house and cotton field closed this grand display of the builders, which, in its completeness and success, has never before been equaled.

IN ANOTHER part of this issue we present some statistics with reference to theater fires. These were compiled a short time since, and have had wide circulation. Since this estimate has been made there has been at least one terrible catastrophe of the same general kind, which should be added to the list there presented. We refer to the burning of the Theater Royal, at Exeter, England. This fire occurred September 5, and, in addition to being a total loss of the building, resulted in the loss of over 100 lives, which, it may be said, were sacrificed to poor construction. And, more recently still, a slight panic occured in one of the theaters in New York, caused by the smoke from a building that was burning two blocks away floating in the upper windows, and some one, under the excitement, yelling "fire." Happily no lives were lost on this occasion, although the shock to the nerves of some of the persons present was very great, indeed. The discussion in the New York papers following this incident brought out the fact that there is not at present existing in the metropolis more than one or two fire-proof theaters. Many of the most popular places of amusement are veritable fire-traps, and it will only be on the score of luck, or, to say the least, good management, if at some time there is not a terrible holocaust in some of them. A new theater now in process of erection in New York is promised to be absolutely fire-proof Evidently there is abundant room for more structures of this most excellent character.

ACCORDING to the correspondent of the *Inter-Ocean*, of Chicago, W. C. Ralston is about to erect a very elaborate hotel on California Beach, near San Diego, Cal. The building is estimated to cost $500,000; is to be built of redwood and Oregon pine, and will be surrounded by 20 acres of grounds adorned by tropical gardens. The establishment is to have accommodations for 1200 guests, and the furnishings will cost upward of $500,000. Looking at it from a disinterested standpoint, we cannot fail to experience a feeling of regret that so much money should be put into the form of a fire trap, for such almost all the popular hotels prove to be at the present time whenever a fire occurs.

AN EXCHANGE has been organized in Cleveland, known as the Cleveland Builders' and Dealers' Exchange. Its headquarters are in Severance Block, No. 161 Seneca street. Members are required to pay $10 annual dues and subscribe for not more than 10 shares of the stock of the company. A circular has been issued setting forth the aims and objects of the company. It states that the plan of the Builders' and Dealers' Exchange is the same in substance as that of the Builders' and Traders' Exchange of Chicago, and is in harmony with the scheme devised by the National Master Builders' Association, recently organized for the purpose of bringing into active co-operation and effective business relation the building trades and industries of the great business centers. Its strict aims and objects may be briefly stated as follows: For the purpose of furnishing and regulating suitable rooms for said exchange in the city of Cleveland; to promote mechanical and industrial interests; to inculcate just and equitable principles of trade; to establish and maintain uniformity in commercial usages by rules and regulations; to acquire, preserve and disseminate valuable business information; to adjust differences and settle disputes between members or between members and others, and for other purposes conducive to the interests of its members. The exchange has been incorporated under the laws of the State, and the capital stock has been fixed at 1000 shares of $10 each.

THE annual crop of papers, which is frequently the subject of newspaper comment, is, in many instances, the forerunner of various obituary notices in the same general line. Some of these are couched in very happy terms, while others are awkwardly made, and in still other cases no notice at all is given of the stoppage. One of the neatest examples of newspaper obituary which has recently come to hand is that of the *Architect, Builder and Mechanic*, of Los Angeles, Cal. We reproduce it in full as being a veritable curiosity. It bears date in August, and is

as follows: "The real estate boom has robbed us of our editor, printer, and office boy; the manager having opened a real estate office, it has become necessary to suspend the publication of this journal until all hands have become millionaires, which, of course, is in the near future. Until then, fraternally yours, &c." This notice was sent out on a postal card and bears the signature of the manager. We shall await the revival of our enterprising contemporary, and shall expect great things of it when both editor and printer, and also office boy and manager, are millionaires. Such a consummation could not be expected anywhere else than in California, but great things are always happening out there.

FROM the seventh annual report of P. G. McGuire, Secretary of the Brotherhood of Carpenters and Joiners of America, issued a short time since, some facts are presented that are of interest to our readers. The secretary estimates the advance in wages that has occurred through the efforts of the brotherhood within a comparatively recent period at an average of 50 cents per day for 20,000 members in 170 cities. This increase has been secured by very few strikes. We gave a summary in our last issue of some work of the organization; additional facts may be of interest. In seven cities the eight-hour system is in force; in 76 cities nine hours are a day's work, and in 131 cities the members are working eight or nine hours on Saturdays. In conclusion, the secretary claims that 160,000 hours less per week represents the gain to the men by the reduction in time. This, he calculates, has provided employment for nearly 3000 additional men.

AT THE RECENT convention of the American Society of Mechanical Engineers Prof. R. H. Thurston, of Cornell University, exhibited a blue print measuring 3½ feet wide by 8 feet long. These dimensions are unusual in prints of this kind, and to those who are accustomed to doing this work by ordinary plans, would seem to be very difficult to produce. The object of this exhibition on the part of Professor Thurston, was to illustrats a new plan by which blue prints may be made and which is applicable, particularly, to large drawings where the size of glass necessary by the usual process would be impossible to obtain. The new plan dispenses with the glass. The sensitive paper with the tracing to be printed, is wrapped around a smooth cylinder, and the work is held in place by spring clamps. The cylinder is then revolved in the sunshine, and as the result an even impression is produced. It is said that the contact between the positive and negative is far more perfect, and the print consequently is clearer than where sheets of plate glass are employed. Builders and others who have occasion to duplicate large drawings, may find this method of service.

THE dangers of and the best means of protection against lightning are subjects that appear to have attracted more attention during the past summer than ever before, though so far as we can discover no new information of a serviceable nature has been brought out by the discussion. One statement especially has received extensive credence—namely, that the casualties from lightning strokes are increasing to an alarming extent. Such a statement is easily made, and a vague sort of support may be given to it by remarking that the associate press is constantly bringing reports of conflagrations and fatal accidents caused by lightning. Without stopping to consider the matter the statement appears plausible, and the deduction reasonable, concerning the increase in this danger. Various causes are assigned to account for this supposed danger increase, and the telegraph wires, manufactories and other things have in turn been held responsible for the greater frequency of thunder storms. Perhaps all this is so, but we do not think it. The lightning nowadays probably does about the some amount of havoc relative to population as heretofore, but now the telegraph and other means of communication keep us informed of disasters which formerly were only known in the district where they happened. It cannot be denied, however, that the danger to property and life from lightning strokes is far from insignificant, and it is therefore the part of wisdom to take all due precautions against it. In other words, we believe that lightning rods are important safeguards if properly constructed and erected, and should be used wherever property owners desire to lessen the danger from this source.

IT may be of interest in this connection to refer to a report prepared by the French Academy of Sciences in reply to a question submitted by the Minister of Public Instruction concerning the fitting of lightning conductors for public schools and other large buildings. The question related to the necessity of connecting the iron stairways and other internal metal-work of a building with the lightning rods. The Academy reported in favor of such connections, and advised that not only the iron in roofs, partitions and stairways should be so connected, but that gas and water pipes, heating apparatus and similar metallic fittings should also form part of the system. Where a building is provided with a number of lightning conductors the metal within should be connected with the nearest rod. We do not know that all will accept this advice as reliable, for it would seem that some arguments might be urged against joining the rods with isolated masses of metal within the building. Where the iron is in the form of a gas or water-pipe it would undoubtedly serve as a conductor and should therefore be connected with the rods without, but in the case of a single mass of metal of limited extent, we fail to understand how it can possibly be a source of danger. Perhaps, however, the report did not imply this. Other things being equal, the most important requirement in fitting a building with lightning rods is that they shall be properly grounded. To simply stick the end a foot or so in dry soil is not of the least use, for the dry earth is practically an insulator, and will seriously hinder the passage of the electric fluid. Rods should always be carried into water, a well for instance, or into moist earth, where they should be surrounded with fine coke or coal. Another plan is to attach them to the water mains, first, however, removing the rust, so as to get contact with the bright metal. Care should also be exercised in having the tips of the rods above the roof bright, as a coating of oxide or rust will insulate the rods themselves against receiving the electric fluid in much the same way that dry earth at the other end will insulate the ground against its outward passage.

We have received from Henry H. Brown, of Battle Creek, Mich., a little book entitled "Alatypes or Stenotypography." It is a system of condensed printing, together with the elements of syllabic shorthand. The effort is, in effect, a method of shorthand printing, and is put forth by the author, a prominent lawyer, as a plan by which the ponderous mass of law reports, encyclopedias, gazetteers and other works of reference might be greatly reduced. The pamphlet contains some 90 pages, and leads the reader from the simple elements of the system up to its briefest form. The page at the close contains a familiar ode without the translation. In appearance the page is a cross between phonographic shorthand and Sanskrit, without any particular preference for either. The work is of interest to all who are giving attention to the effort that is now being made to systematize English spelling and reduce printed speech to the simplest possible compass.

THE PLATES.

Plate XXXVII of this issue shows the interior of a library in a noted English house. The room forms a part of a new wing which has recently been added to a picturesque old mansion in Bonallytown, Midlothian, which was long the residence of Lord Cockburn, the famous English judge. According to the English architectural exchange to which we are indebted for the plate, the ceiling and bookcases are of wainscot, and the fireplace is a replica of that which was lately destroyed in the Hall of the Knights Templar at Linlithgow. The two circular turrets and the deep ingle nook form cheerful and pleasant features in the room, and give it a comfortable and homely air. The architect is Mr. Sydney Mitchell, Edinburgh.

In Plates XXXVIII and XXXIX are presented elevations and floor plans of a house designed by Miss Minnie M. Packer, an account of which will be found in another part of this issue.

In Plate XL is presented a design for a sideboard, also a seat for a recess and a hanging cabinet, the author of which is R. A. Briggs, a well-known British architect. These articles were produced for a house at Hampstead. Referring to the sideboard, which was designed *en suite* with some furniture for a dining-room, it may be stated that it is of walnut, the side projecting doors being filled with lead glazing, and the centers being of beveled glass. The lead work is gilt. Behind the balusters to the top cupboards silvered glass is placed.

Architectural Photographs.

Oliver Everett, No. 1912 Webster street, San Francisco, Cal., has issued recently what he terms the "West Coast Architectural Series," consisting of photographic views of the most prominent buildings in San Francisco and vicinity. Three sets have been issued, each composed of 12 photographs 4½ x 7½ inches in size, mounted on cardboard 7 x 10 inches. The first series consists of residences and dwellings, the second of churches, the third of public buildings and halls. A fourth series is announced, consisting of selections from the principal banks and principal blocks in the city. From selections from each of these series before us, we can speak of the interest that these photographs have for architects and builders in general. As many of our readers know, the Pacific Coast has, in some respects, its own ideas of architectural features, especially in matters of detail; and, accordingly, there is a refreshing diversity in the views thus presented as compared with much that is current in the Central and Atlantic States. The residences shown are, some of them, very elaborate, while others are of moderate cost. The public buildings are as unlike the public buildings current in the Eastern part of the country as the other class of buildings referred to, except, perhaps, the United States mint, which, in some respects, resembles the older Government buildings distributed throughout the country. A key accompanies each series, giving the name of the building and the architect.

The fifty-sixth annual exhibition of the American Institute is now in progress. The buildings have been extensively repaired and painted inside and outside. A prominent feature of the display is the electrical department which occupies nearly one-half of the building.

Our Future Timber Supply.

Prof. Charles S. Sargent, one of the special agents of the tenth census, in his report on the forests of North America, gives it as his opinion that the forests of the United States, notwithstanding the great and increasing drains upon them, are capable of yielding annually, for many years longer, a larger amount of material than has yet been drawn from them, even with our present reckless methods of forest management. It is true that the great pine forest of the North has already suffered fatal inroads, that the pine that once covered New England and New York has disappeared, and that Pennsylvania is nearly stripped of what once appeared to be a nearly inexhaustible supply of the same wood. But the great Northwestern pineries are not yet exhausted, and, with the newly introduced methods by which logs once supposed inaccessible are now profitably brought to the mills, they may be expected to increase the volume of their annual product for a few years longer in response to the growing demands of the great agricultural population which is fast covering the treeless mid-continental plateau.

The area of the pine forest, however, remaining in the great pine-producing States of Michigan, Wisconsin and Minnesota, is dangerously small in proportion to the country's consumption of white pine lumber, and the entire exhaustion of these forests in a comparatively short time is certain. The wide area now covered in New England by a vigorous second growth of white pine, although insignificant in growth and productiveness in comparison with the forests that it replaces, must not be overlooked in considering the pine supply of the country. These new forests which are already yielding between 200 and 300 million feet of timber annualy, are capable of great future development.

The pine belt of the South Atlantic region still contains immense quantities of timber unequaled for all purposes of construction, although unsuited to take the place of the white pine of the north. The Southern pine forests, although stripped from the banks of streams flowing into the Atlantic, are practically untouched in the Gulf States, especially in those bordering the Mississippi River. These forests contain sufficient material to supply all possible demands that can be made upon them for a long time.

The hardwood forests of the Mississippi basin are still, in certain regions at least, important, although the best walnut, ash, cherry, and yellow poplar have been largely culled. Two great bodies of hardwood timber, however, remain, and upon these comparatively slight inroads have been made as yet. The most important of these forests covers the region occupied by the Southern Allegheny mountain system, embracing Southwestern Virginia, West Virginia, Western North and South Carolina, and Eastern Kentucky and Tennessee. Here oak unequaled in quality abounds, walnut is still not rare, although not found in any very large continuous bodies, and cherry, yellow poplar, and other woods of commercial importance are common. The second great body of hardwood, largely oak, is found west of the Mississippi River, extending from Central Missouri to Western Louisiana.

The forests of Michigan, especially those of the northern peninsula, still abound in considerable bodies of hardwood, principally maple. Throughout the remainder of the Atlantic region the hardwood forests, although often covering considerable areas, have everywhere lost their best timber, and are either entirely insufficient to supply the local demand of the present population, or must soon become so.

In the Pacific region the great forests of fir which extend along the coast region of Washington Territory and Oregon are still practically intact. Fire and the axe have scarcely made a perceptible impression upon this magnificent accumulation of timber. Great forests of pine still cover the California Sierras through nearly their entire extent. The redwood forest of the coast, however, once, all things considered, the most important and valuable body of timber in the United States, has already suffered seriously, and many of its best and most accessible trees have been removed. This forest still contains a large amount of timber, although its extent and productive capacity have been generally exaggerated. The demand for redwood. the only real substitute for white pine produced in the forests of the United Stutes, is rapidly increasing, and, even at the present rate of consumption, the commercial importance of this forest must soon disappear.

The pine forests that cover the western slopes of the northern Rocky Mountains and those occupying the high plateau and inaccessible mountain ranges of central Arizona and southwestern New Mexico have not yet suffered serious damage at the hands of man. The remaining forests of the Pacific region, of little beyond local importance, are fast disappearing. The area of these interior forests is diminished every year by fire and by the demands of a careless and indifferent population, and there complete extermination is probably inevitable.

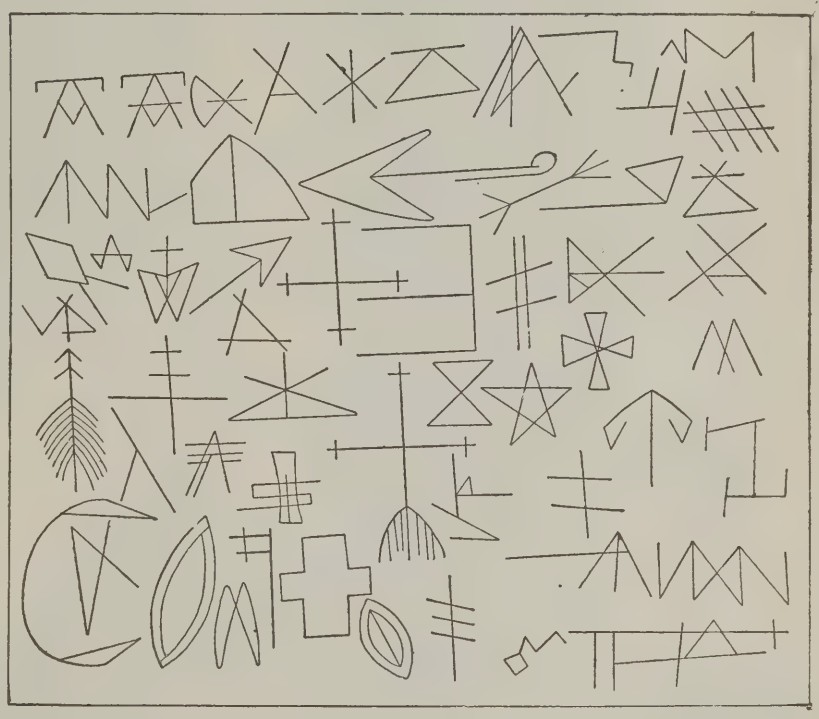
The forest wealth of the country is still undoubtedly enormous. Great as it is, however, it is not inexhaustable, and the forests of the United States, in spite of their extent, variety and richness, in spite of the fact that the climatic conditions of a large portion of the country are peculiarly favorable to the development of forest growth, cannot always continue productive if the simplest laws of nature governing their growth are totally disregarded.

The judicious cutting of a forest in a climate like that of the Atlantic or Pacific coast regions entails no serious or permanent loss. A crop ready for the harvest is gathered for the benefit of the community; trees that have reached their prime are cut, instead of being allowed to perish naturally, and others take their place. The permanence of the forests in regions better suited for the growth of trees than for general agriculture may thus be insured. Two causes, however, are constantly at work destroying the permanence of the forests of the country, and threatening their total extermination as sources of national prosperity—fire and browsing animals inflict greater permanent injury upon the forests of the country than the axe, recklessly and wastefully as it is generally used against them.

Manufacturers and architects have had their attention called to a fire proof paper or board made of a composition containing 60 per cent. vegetable fiber, 20 per cent. ashes, 10 per cent. alum or copperas and 10 per cent. plumbago, lamp black or venetian red. It is mixed in a pulp engine, and run through an ordinary paper machine into boards, and is found to have great fire-resisting properties.

Masons' Marks.

In ancient mason work marks are found cut on the face of the stone. In more modern times the marks were cut on the top of the bed. The change from the face to the top, in all probability, was introduced with classic architecture, the latter requiring a fine finish on the face. The art of writing was not generally acquired in the early days, and stone cutters or masons, as well as those above them, most generally signed their name with a cross. In order that the foreman should be able to know who was responsible for a given stone, and to save disputes as to the manner of working a stone, it was the custom for each mason to adopt a particular mark and apply this to each stone that he cut. In early work these marks can be seen on the face of the stone and serve a double purpose. They are the signature of the mason to his work, and also an instruction to the setter as to which part of the stone goes upward in the building. The accompanying sheet of masons' marks represents characters found on the walls of Westminster Hall, and are drawn by Mr. Shelmerdine. Concerning these Mr. Shelmerdine says: "Nearly all the accompanying marks are on the three first bays at the northwest end of the hall. The marks occur in different positions on the wall, some on the lower course, and similar marks on different courses higher up. If these marks are the work of separate masons, there must have been a great number at work, for this could only represent a small portion employed at the time. Some of the marks seem to represent monograms others the cross, axe, level, arrows, &c. I noticed the other day, on some of the remains of Roman London, at the Guildhall Museum, similar marks, but cut much deeper, but not on the face of the stone."

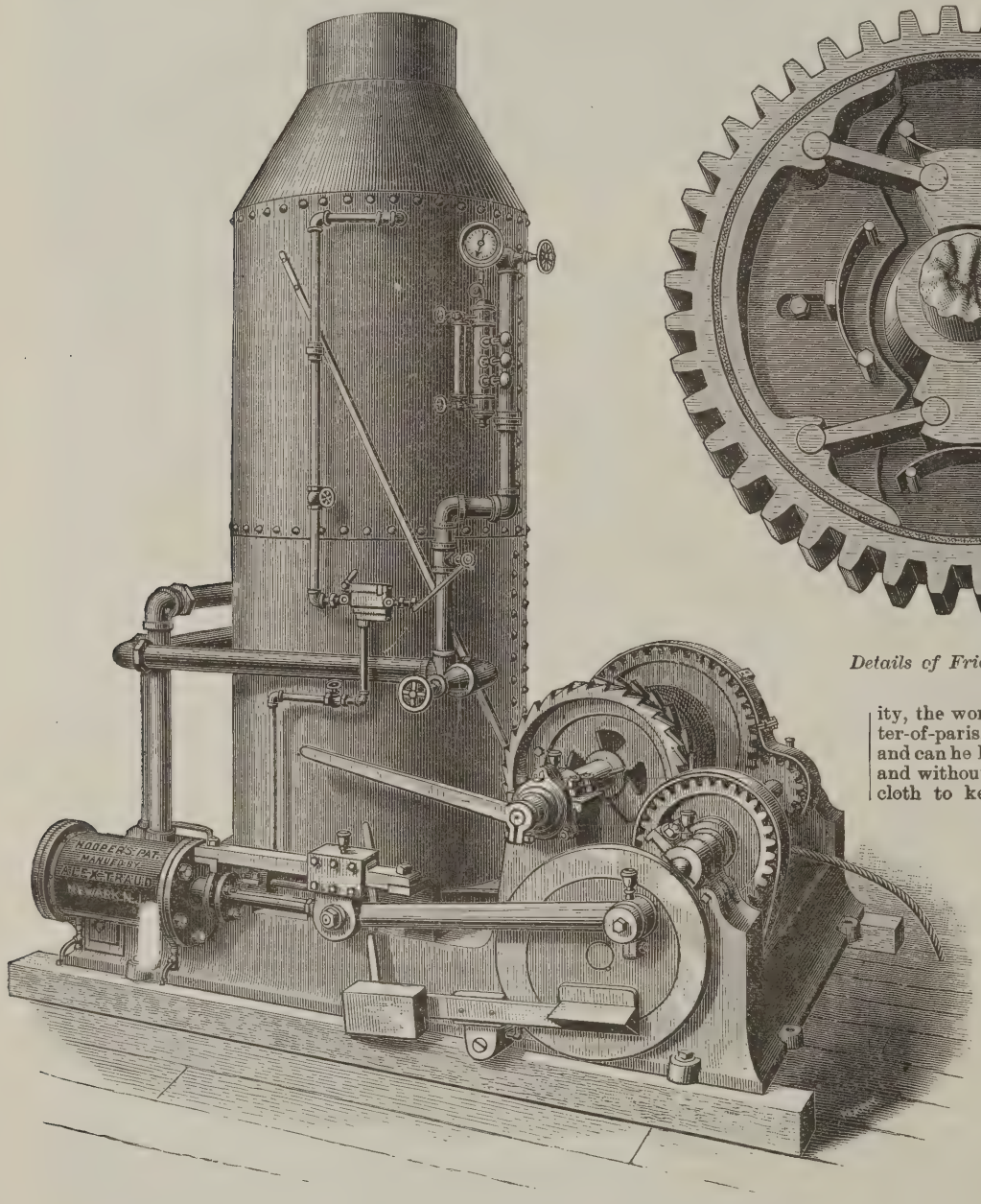


Masons' Marks.

In work of the present day a paint-pot and brush takes the place of a graven inscription. Workmen are closely superintended by the foremen and engineers, and the key to the marks on the stone, some of which are sometimes almost as enigmatical as the hieroglyphics shown in the cut, is the drawing of the structure. A comparison of old and new methods is always of interest.

New Hoisting Engine.

The accompanying engraving represents a new hoisting engine that is of interest to builders and contractors in general. It is the invention of Irving G. Hooper, and is built by Alexander Traud, Newark, N. J The machine may be described as being of the friction clutch variety. As will be seen by the engraving, it is strong and durable and fitted for the rough usage to which such devices are subjected. There are peculiarities of construction about it which, it is claimed, make it extremely simple and adapted to a very wide range of work. The bed of the machine and all of the journal boxes are cast in one piece, and accordingly bolts and other fastening devices are avoided. The second engraving presented herewith shows details of the friction clutch. This, it will be noticed, is of novel construction. Two circular rings are forced outward by means of four toggles, which are direct in their action. These are hinged to the circular rings, and also to sliding blocks, giving powerful motion. A sheet of vulcanized fiber is interposed between the friction surface, and can be readily renewed. This requires no fastening, being simply laid in place.



General View of New Hoisting Engine, Built by Alexander Traud, Newark, N. J.

Details of Friction Clutch.

Modeling in Wax.

For modeling delicate ornamental work of almost any kind there are few materials that possess so many advantages as a suitable wax. While the artist usually prefers clay, it is because of its cheapness and peculiar adaptability for large work. Indeed, for anything of size it is preferable to any other substance which has yet been discovered. It has, however, very serious disadvantages which cannot be overcome by ordinary methods. In drying it cracks, unless great care is taken with it. It cracks rapidly, and even when dry has very little strength. If the work is left for any considerable length of time it cannot be resumed again. In fineness of grain it is lacking, and the most delicate classes of work in clay become so fragile, and are formed with such difficulty, that most artists prefer some other means for working out their designs.

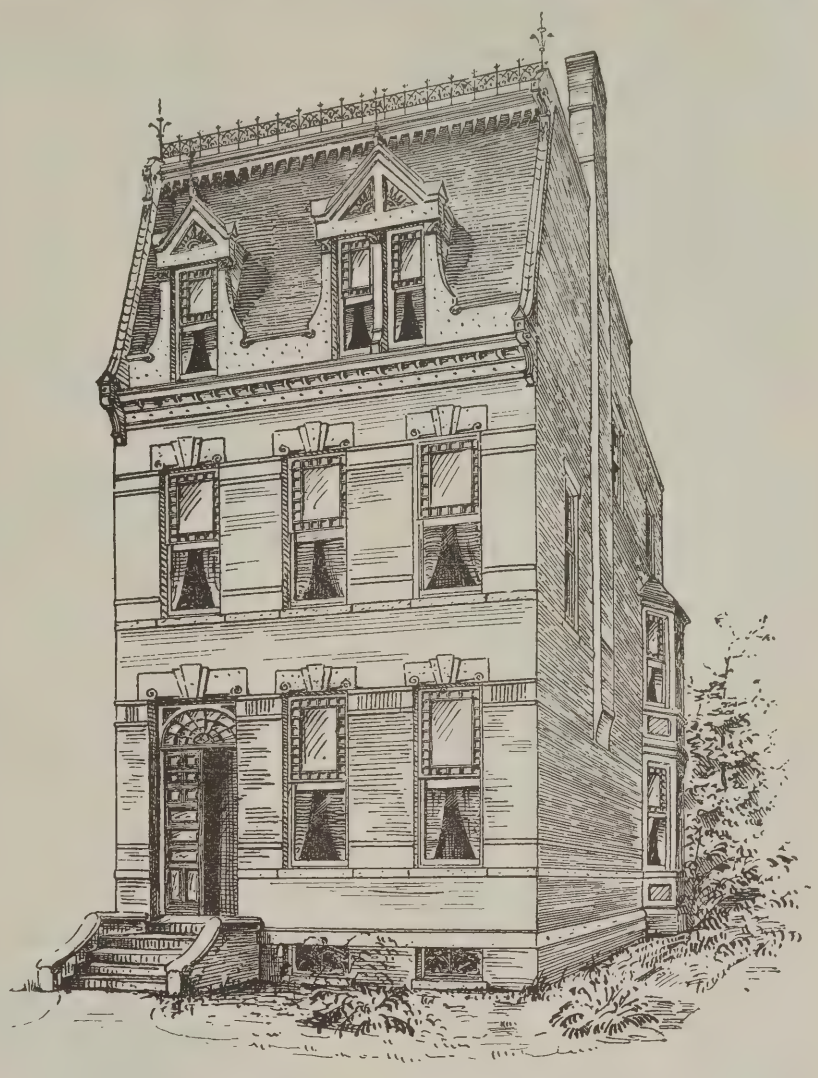
For all classes of delicate relief ornamentation, whether it is to be carved or cast in metal, a pattern executed in some plastic material is not only a great assistance but is of almost vital importance. By the use of a model produced in this way the artist has a freedom of execution and a command over his design which cannot be obtained by any system of cutting away from a block or of carving pure and simple. Alterations, additions and changes of every kind are made with freedom, ease and rapidity. In working out designs for panels, for moldings, or making such ornamental work as is usually employed in stove work, wax is a material which has immense advantages over clay. It is, first, permanent. When once put in shape, if the wax is of a good quality, the work is nearly as permanent as plaster-of-paris. It will stand more washing, and can he left without a moment's warning, and without protection other than that of a cloth to keep off the dust. There is no shrinkage to fear and no danger that sudden drying will put all the work in jeopardy. The work can be left for five minutes or five years and then taken up again without difficulty. After some months a good and well compounded wax will harden on the surface and acquire a skin which is very desirable in protecting it from harm. This, however, is not a difficulty in working, because the skin yields to the action of a warm tool, and behaves kindly as if no hardening had taken place. The wax model is so much lighter than clay that a comparison can hardly be made between them. In consequence the wax model is so much stronger even than the dried clay. Wax adheres strongly to glass, porcelain, wood, slate, and, in fact, to almost any substanceto which it may be applied. This property can sometimes be utilized by decorating portions of patterns which have been made by the ordinary methods, and when the wax has become hard, putting the whole in the sand and making a casting, or, better yet, making a plaster-of-paris cast. For electro plated work, the wax can go into the battery and a metal impression can be taken. From this impression the most perfect reproductions can be made. Copies produced in this way can scarcely be distinguished from the originals even by experts.

The one drawback which has done much to prevent artists, carvers, pattern-workers and others from using wax as a plastic ma-

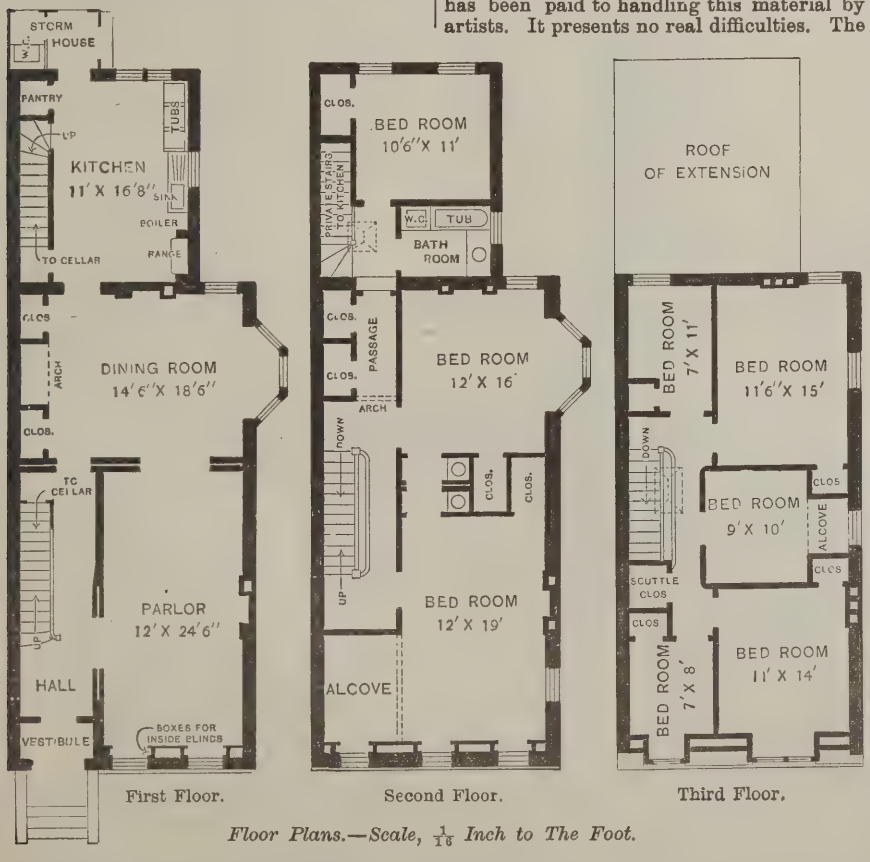
ed. This feature of construction saves the liability to shake loose from the constant jar to which machinery of this kind is subjected. This construction also insures the parts remaining in line, which the reader will recognize, as an important consideration. The construction is such that the machine may be changed from a double to a single gear in a few minutes of time, and that, too, by unskilled labor. By loosening the cap screws, the cap may be thrown back on the hinges shown in the engraving This furnishes a bracket-bearing to receive the gear shaft, and when in this position the machine may be run with single gear. This provision adapts the machine for doing the work of two machines, as ordinarily con-

terial, has been the high price asked for it at the artist material stores. In New York, one dealer asks $1 per pound, while an old man who frequents the studios has quite a trade because he can supply a very dull colored compound, which he calls wax, for the modest sum of 50 cents per pound. Its manufacture has always been guarded as something of a secret, though all the receipt books pretend to give rules for making it. The difficulty with all the recipes is that they are altogether too scientific or too complicated. The proportions are usually given with great exactness, and then directions follow which leave the reader in doubt as to whether there are any proportions whatever.

The best wax, whether for winter or summer use, which we have ever seen was prepared in a most simple manner, and after several years seems just as fine and quite as pleasant to handle as when first made. In color it is red, and this is probably, all things considered, the best color for modeling wax. The books say that "other pigments" may be employed. Apparently there is some kind of chemical action which takes place between the pigments and wax which is important. To make a modeling wax we first take beeswax as a foundation. The common yellow kind—pure if possible—is used. To this is added lard, pound for pound. When both are melted and thoroughly mixed, red lead is added in the proportions of 1 pound for every 2 pounds of the mixture of lard and wax. Vermilion can be used for the same purpose if one wishes a very gilt-edged and expensive article. Except in color the more expensive is no better than the other. We have in this mixture the foundation for the wax. But as the lard contains varying quantities of water and lime there is no fixed rule that can be given for proportions. In making the wax a little sample is taken out and tested; if too soft more beeswax can be added; if too hard more lard will make it softer. Olive oil is sometimes employed for softening and rosin for hardening. The wax tallow and coloring will however give a good compound. By figuring the cost of 3 pounds at the ordinary retail prices, it will be seen that the cost is about 68 cents, or less than 25 cents per pound. The margin of profit at the ordinary prices is, to say the least, sufficient to cover the cost of making. As the material has an unlimited usefulness, it can be used over and over again or preserved for years, the cost is not an important matter. Most of the books speak of wax as a difficult material to work. This seems to have arisen from the fact that but little attention has been paid to handling this material by artists. It presents no real difficulties. The ordinary boxwood tools answer very well and a trace of oil on them, or even water, will cause them to work easily. But in general it is best to remember that a little heat will greatly assist in overcoming any refractory qualities of the wax and enable the worker to modify his masses as he would in clay. A hot piece of knife blade will make divisions, or solder parts together when making additions.



Brick House for a City Lot.—Designed by Charles E. Hebbard, New York.



Floor Plans.—Scale, $\frac{1}{16}$ Inch to The Foot.

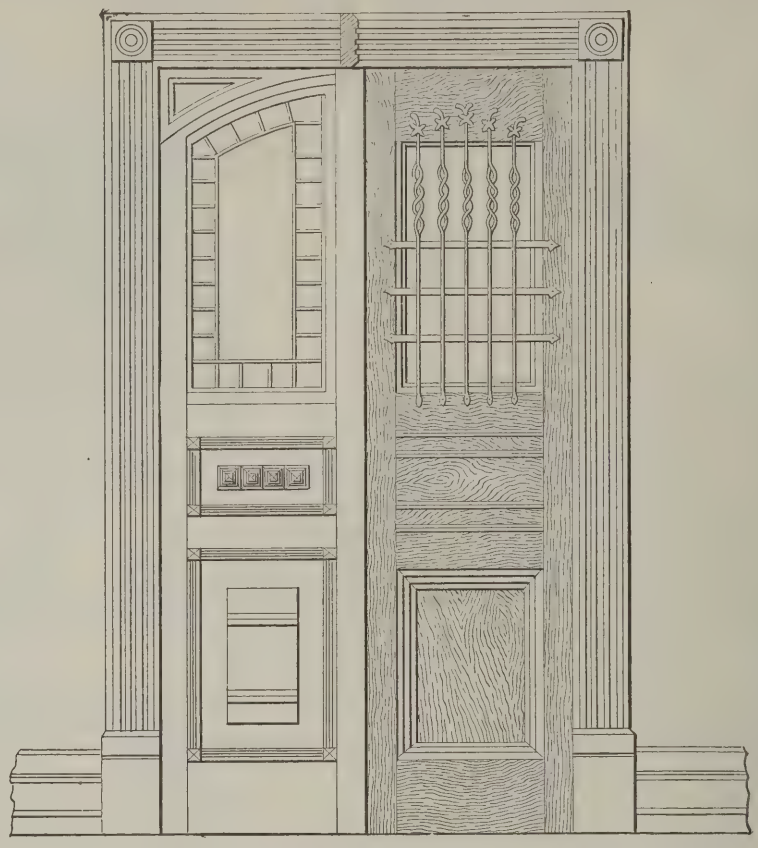
A Brick House for City Lot.

The accompanying perspective view and floor plans represent a pleasing design for a town house adapted for erection upon a lot of ordinary dimensions. It differs from the conventional New York house in the fact that it is not of the high stoop and basement variety. It will be found useful in smaller cities, especially where houses are not built so close together as to make side windows an impossibility. Referring to the floor plans, it will be noticed that there is a good-sized parlor to the right of the entrance hall, back of which is the dining-room. Communication between these rooms is had through sliding doors. The dining-room is well lighted by a bay-window, and is provided with space for a sideboard and two commodious closets. Access to the cellar is by means of stairs under the principal stairway leading to the second floor. The kitchen is in the rear of the dining-room, and there is also provided, by means of stairways built therein, access to both kitchen and the floor above. The plumbing in the kitchen is of the usual variety. On the second floor is a large bedroom and an alcove in the front, with a small bedroom in the back. A portion of the building on this floor is occupied by the bathroom. Each of the chambers is provided with commodious closets, and additional closets are given with the principal chambers, where set-basins are placed. Two closets also open out of the hall. The attic floor, which is lighted with dormer windows from the front

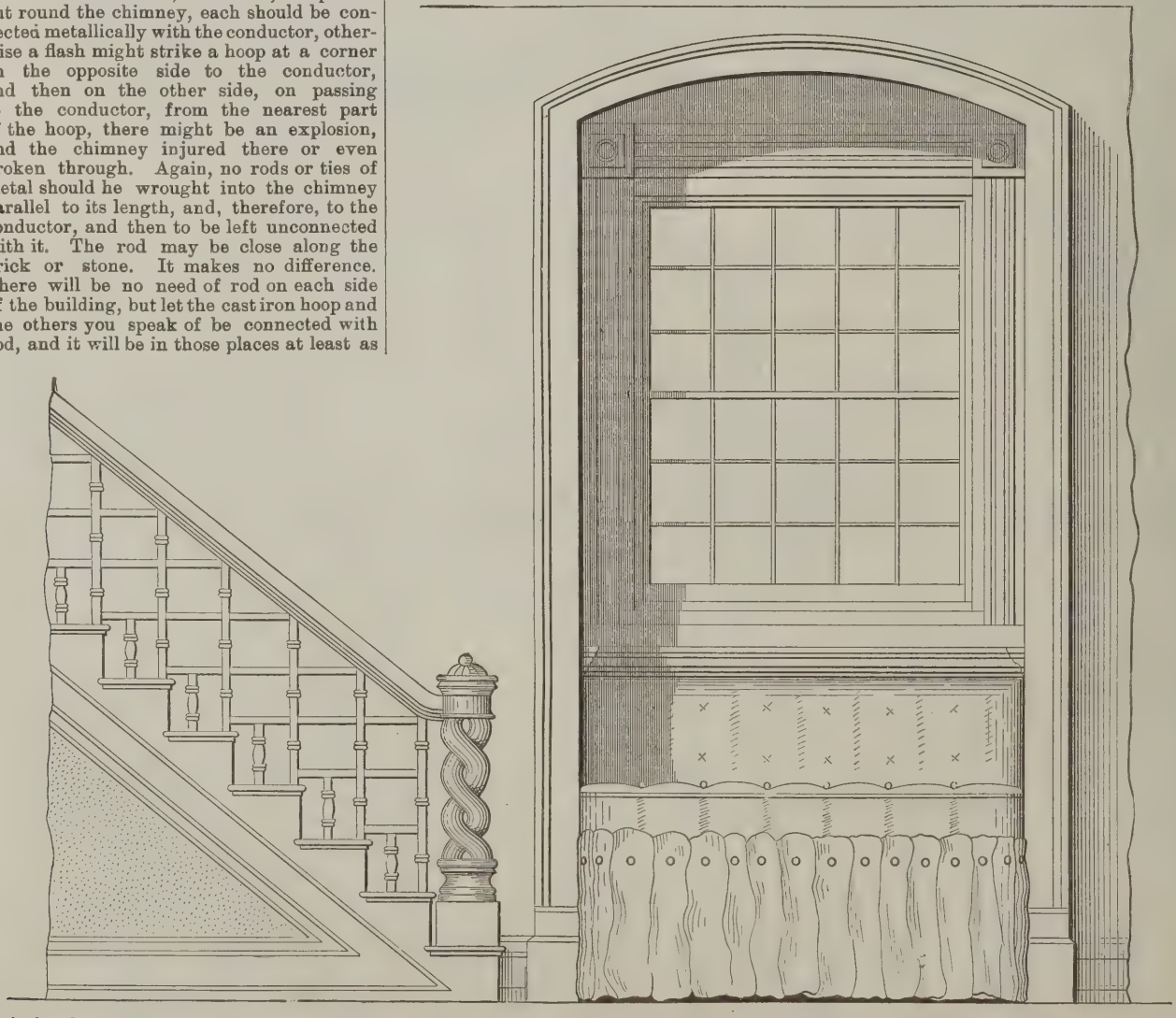
and also by side windows and windows in the rear, contains five bedrooms, each of which is provided with a closet. The building is designed in a way to be built in pairs, or, as it is sometimes expressed, as a double house, one side wall, as will be noticed, being solid. This design was prepared by Charles E. Hebbard, architect, 62 Broad street, New York.

Lightning Rods for Tall Chimneys.

Speaking of lightning rods for tall chimneye, M. Faraday, in the *Architect and Builder*, London, says: "The conductor should be of half inch copper rod, and should rise above the top of the chimney by a quantity equal to the width of the chimney at the top. The lengths of rod should be well joined metallically to each other, and this is perhaps best done by screwing the ends into a copper socket. The connection at the bottom should be good; if there are any pump pipes at hand going into a well, they would be useful in that respect. As respects electrical conduction, no advantage is gained by expanding the rod horizontally into a strap or tube—surface does nothing; the solid section is the essential element. There is no occasion of insulation (of the conductor), for this reason. A flash of lightning has an intensity that enables it to break through many hundred yards (perhaps miles) of air, and therefore an insulation of 6 inches or 1 foot in length could have no power in preventing its lead to the brickwork, supposing that the conductor were not able to carry it away. Again, 6 inches or 1 foot is so little that it is equivalent almost to nothing. A very feeble electricity could break through that barrier, and a flash that could not break through 5 or 10 feet could do no harm to the chimney. A very great point is to have no insulated masses of metal. If, therefore, hoops are put round the chimney, each should be connected metallically with the conductor, otherwise a flash might strike a hoop at a corner on the opposite side to the conductor, and then on the other side, on passing to the conductor, from the nearest part of the hoop, there might be an explosion, and the chimney injured there or even broken through. Again, no rods or ties of metal should he wrought into the chimney parallel to its length, and, therefore, to the conductor, and then to be left unconnected with it. The rod may be close along the brick or stone. It makes no difference. There will be no need of rod on each side of the building, but let the cast iron hoop and the others you speak of be connected with rod, and it will be in those places at least as if there were rods on every side of the chimney. A three-fourths rod is no doubt better than a half inch, and, except for the expense, I like it better. But a half inch has never yet failed. A rod at Coutts' brewery has been put up 1½ inches diameter; but they did not mind expense. The Nelson column, in London, has a half inch rod—three-fourths is better. I do not know of any case of harm from hoop iron inclosed

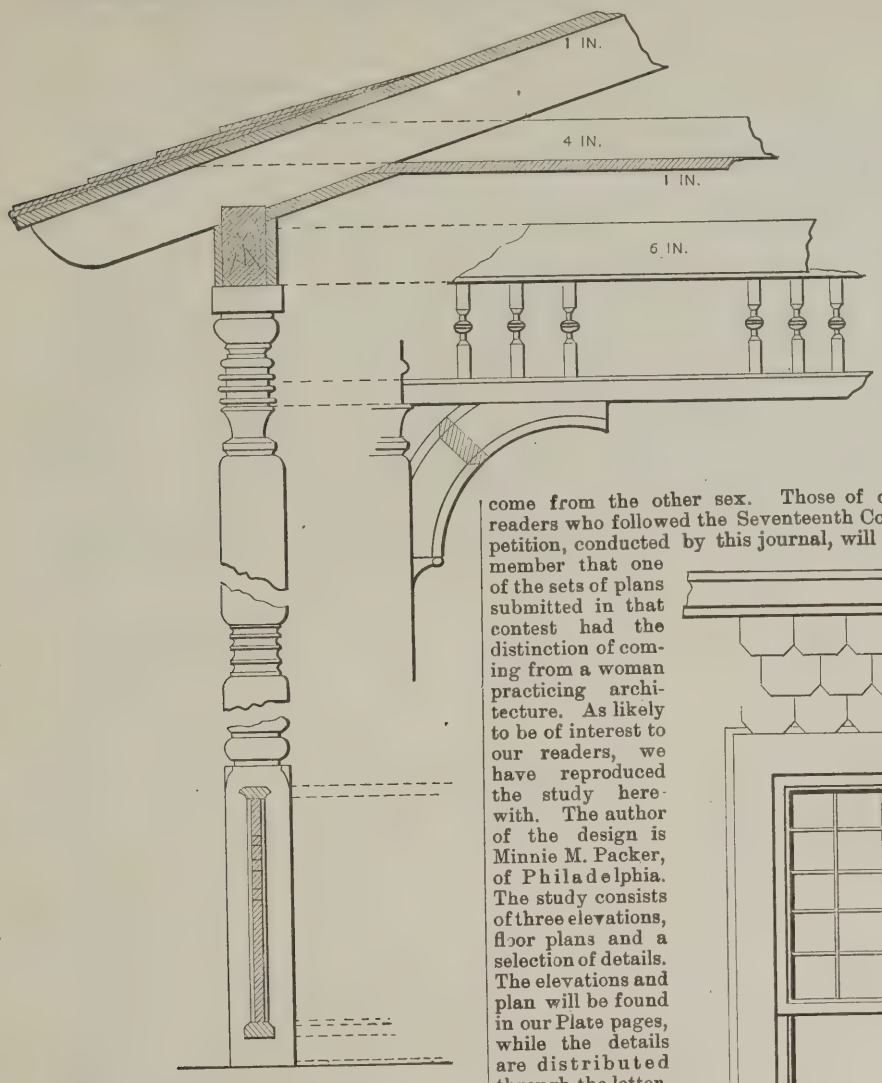


Details of Vestibule and Exterior Doors.—Scale, ½ Inch to the Foot.



Details of House Designed by Miss Minnie M. Packer, Philadelphia.—Stairs and Window in Front Hall.—Scale, ½ inch to the Foot. For Elevations, See Plate XXXVIII.

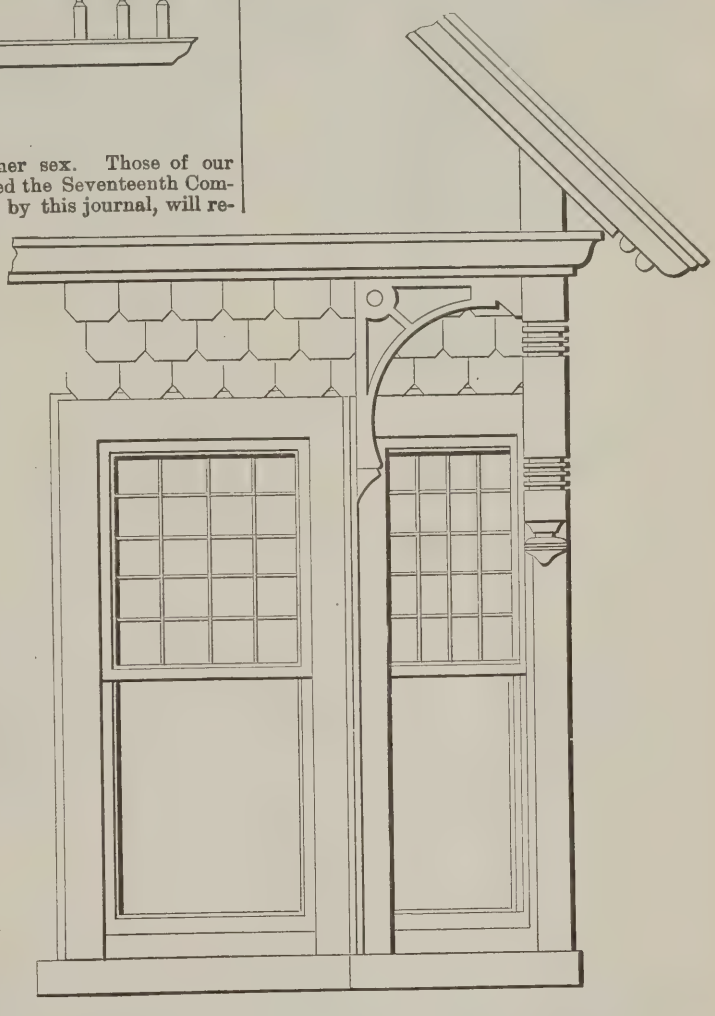
in the building, but if not in connection with the conductor, I should not like it; even then it might cause harm if the lightning took the end furthest from the conductor.



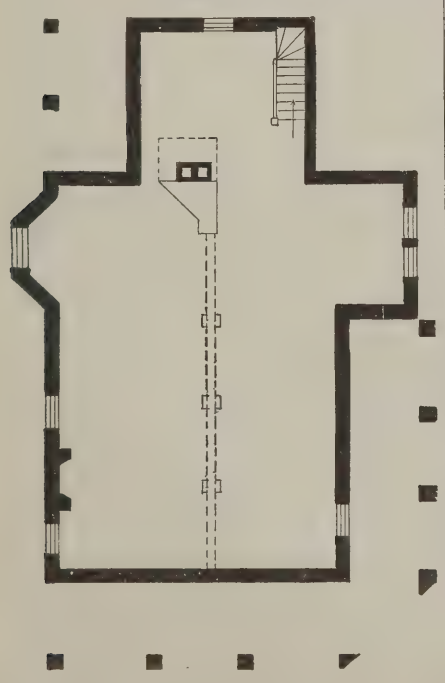
Detail of Piazza Work.—Scale, ½ Inch to the Foot.

A Study in House Planning.

It is not often that *Carpentry and Building* has the opportunity of laying before its readers evidences of the ability of women to act in the capacity of architects and designers. With the exception of the letters from "Farmer's Daughter" and "A Carpenter's Wife," all that we have so far published has come from the other sex. Those of our readers who followed the Seventeenth Competition, conducted by this journal, will remember that one of the sets of plans submitted in that contest had the distinction of coming from a woman practicing architecture. As likely to be of interest to our readers, we have reproduced the study herewith. The author of the design is Minnie M. Packer, of Philadelphia. The study consists of three elevations, floor plans and a selection of details. The elevations and plan will be found in our Plate pages, while the details are distributed through the letter-press pages A brief specification for the house was submitted by the author. The building, with a very slight modification, was erected some time since at Media, Pa., from which it will be seen that Miss Packer's work is practical as well as theoretical. The contract at that time was signed for about $3000, including heater, range and plumbing. This will indicate the general value of the structure. The author, in commenting on the arrangement of the floor plan says that she has attempted to make the inside arrangements as attractive as possible, and has shown what she believes, with taste in furnishing, will secure an air of luxury without extravagant cost. The foundation of the building is intended to be of good stone, pointed in black mortar. The inside partition walls are to be supported by 8 x 8 white pine posts. The wall sill is to be 6 x 8, made of 3 x 8 pieces spiked together. Hip and valley rafters are specified 3 x 8 inches, door and window studs 3 x 4 inches, and intermediate studs 2 x 4 inches. The frame is to be sheathed throughout. The lower story is to be finished with No. 1 German siding. The second story, gables and projections in No 1 white pine shingles cut in ornamental shapes. Building paper is to be used under all sidings, shingles and slate, the latter being the roof covering. The porch floors are specified to be of smooth yellow pine. No. 1 Virginia flooring is to be used on the first and second floors, and No. 2 in the third story. The pantry and closets are to be fully shelved and furnished with hanging strips. The porch posts are to be turned. Outside shutters are specified for rear windows and inside shutters for all other windows on first and second floors. A folding door is provided between the hall and the parlor, and a glass panel is specified for the vestibule door, which in other respects is to be like the front door. A sliding door is to be used between parlor and library, and a folding-door between library and dining room. The architraves are to be 4 inches wide. The wash-boards for first floor are to be 7 inches, the second floor 6 inches, and in attic and closet 5 inches. Bangor slate of the best grade is specified for the roof, with gutters and flashings of the best quality of tin. A walnut newell, with corresponding rail and balusters, is named for the front hall. An excellent grade of glass is specified. The painting is to be three-coat work on the outside.

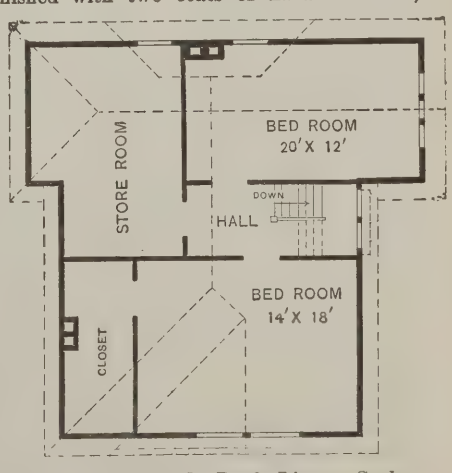


Detail of Corner.—Scale, ½ Inch to the Foot.



Foundation Plan.—Scale, $\frac{1}{16}$ Inch to Foot.

The kitchen is to be grained in imitation of ash. The first and second stories are to be furnished with two coats of hard oil finish, rubbed down, and one coat of varnish. The specification also contains references to heater, range, sink, drain, hot water boiler, bath-tub, water-closet, tank, force pump, &c.



Attic Plan, With Roof Lines.—Scale, $\frac{1}{16}$ Inch to the Foot.

ROOFING NOTES.

Glazed Metallic Tile.

We believe that some experiments have been made in this country looking to the manufacture of sheet-metal tile for roofing purposes, to be glazed something after the style of the agate and granite ware, now so extensively employed for domestic purposes. So far, we believe, the idea has not passed the experimental stage. Some of the difficulties encountered, as we are informed, are due to the brittleness of the coating and the liability to crack in the process of laying. From our German exchanges, it would seem that one or two companies in Europe have succeeded in finding a glaze that is sufficiently elastic for the purpose, and which permits the production of glazed roofing plates, both in large and small sizes, in a way to admit not only of their being successfully laid, but even to allow of workmen climbing and walking over them. Some account of this work, gleaned from some articles which appeared a short time since in a German exchange will, perhaps, be of interest to our readers. The work in question is manufactured by the Schwelm Enamel Works, in Westphalia; Braselmann, Putmann & Co., being the proprietors. We learn that the shingles, or roofing plates, are rolled from the best sheet iron, and are afterward subjected to a patented process by which both sides are covered with a heavy coating of enamel. This enamel is of a nature to adhere very firmly, and makes the shingles water-proof. The enamel is of such a nature as to resist the attacks of strong acids and alkalies. The coating at the same time is a poor conductor of heat, and, accordingly, it protects the building to which the enameled plates are applied from extremes of temperature. Being a non-conductor, it also has an advantageous influence with reference to electrical currents, and thereby escapes the consequent corrosion of the metal. In order to facilitate climbing over the roofs, and also to break up the surface so as to deprive the reflected rays of light in a way to prevent the disagreeable glare that otherwise would occur, the surface of the plates is roughened. While this roughening, which of course would permit the accumulation of dust, to a certain extent facilitates the purpose in view, it also is managed in certain cases in a way to contribute a pattern or figure to the tile. The dust is readily washed away by the rain, and, accordingly, the surface of the roof is always neat and clean. We are informed that enameled shingles are manufactured in various styles. Three leading sizes are kept on hand. The first of these measures some 40 x 20 inches; the second about 14 x 20 inches, and the third is in the neighborhood of 15 inches square. Each of these is made in two forms, either with or without the projections for roughening the surface, as already described. A number of engravings accompany the article in the German exchange to which reference has been made. From these we reproduce the accompanying engravings. Fig. 1 represents the face and cross section of one of these shingles, being a pattern that is in very extensive use. It will be noticed that the edges are bent very much the same way as is followed in this country with flat seam roofing. In laying, these edges constitute the hooks or locks between the sheets. They are laid square or diamond fashion, as illustrated in Fig. 2. Other variations are shown in Figs. 4 and 5; while Fig. 3 shows a rectangular shape, which is likewise extensively used. This has no flat seams bent down, but it is laid upon a plan, as we gain from the account before us, analogous to our standing seam roofing. These rectangular plates have their surfaces broken up by two longitudinal corrugations, which add materially to the appearance of the roof on the building. The plates of the kind shown in Fig. 3 are said to be in special demand for factories, churches, warehouses and the like. A feature that has been introduced with these shingles that is a novelty, so far as practice in this country is concerned, is illustrated in Figs. 6 and 7. In this case, the interior space is filled by a glass set in the face of the tile and adapted to be opened, thus constituting a very simple skylight, or combined skylight and ventilator, as may be required. Suitable roof trimmings, also enameled, are manufactured, including a plain ridge-piece, and also half tile for use at the eaves. These are shown in the accompanying engravings. Among the advantages to which attention is directed may be mentioned the lightness of a roof covered with enameled shingles. Attention is also directed to the fact that in their laying simple lathing is entirely adequate. Solid boarding is declared to be unnecessary. Comparison is made with other materials, greatly to the advantage of the enameled plates. Contrasted with the ordinary earthen tile roofing, it is shown that the latter weighs nearly seven times as much; slate, it is declared, weighs almost five times as much; zinc something over three times as much. In fact, the enameled tile are put at less in weight than the ordinary composition roofs. In price it is asserted also that there are some things to be said in favor of these shingles. They are said to rank about the same in cost as German, Belgian and French slate, and are somewhat cheaper than zinc. Of course we cannot make the figures specific in this case, because the prices are given in marks and in a country where the conditions are very different from what they are here.

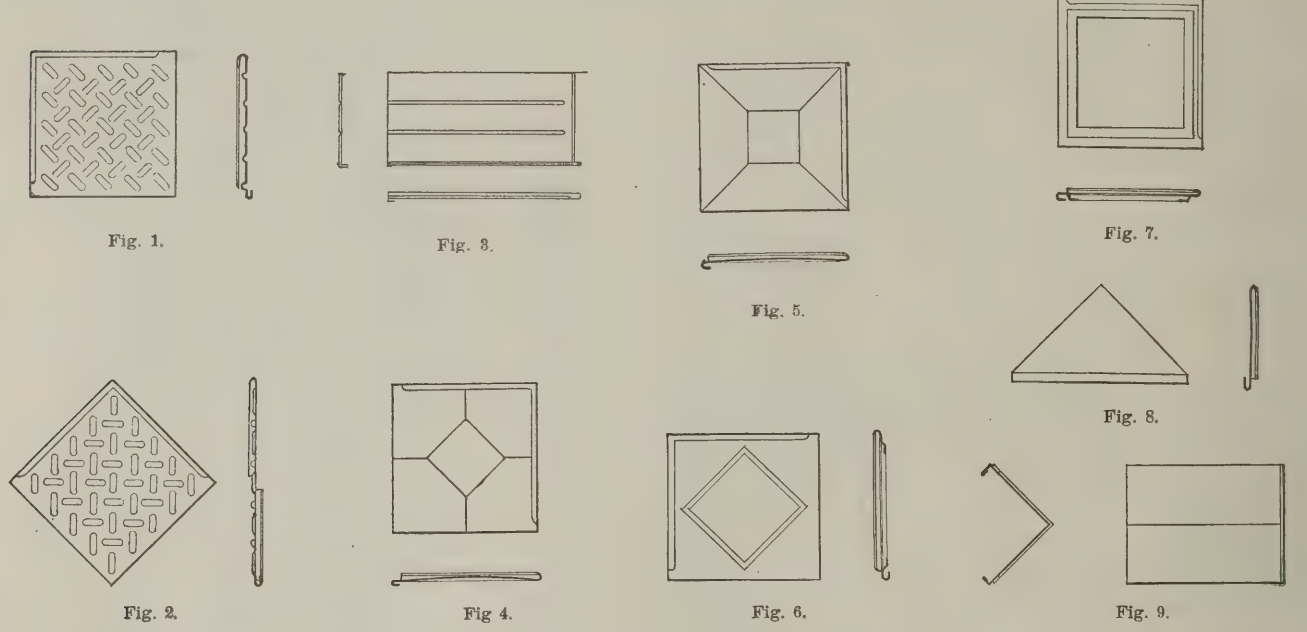


Fig. 1. Fig. 3. Fig. 5. Fig. 7.

Fig. 2. Fig 4. Fig. 6. Fig. 8. Fig. 9.

Glazed Metallic Tile.—Forms of Tile and Roof Trimmings as at Present Produced in Westphalia.

Metal Roofs as a Protection Against Lightning.

In *The Metal Worker* for June 25, there appeared the following: A correspondent of the *Journal of Commerce* presents the following question: "Is it practically an impossibility for a building covered with corrugated iron roofing to be "struck" by lightning? Is such a roof quite safe if connected with the ground with strips of sheet copper, said strips riveted to the iron roof and riveted to an iron rod into the ground? Will lightning leave said copper and follow into the building if the strip is simply fastened with common iron staples, and would the copper touching the woodwork be unsafe?" To this the Editor replies as follows: Iron ships have been struck and damaged by lightning. So a building covered with an iron roof might be rent and torn by lightning, although the roof was connected with the ground by strips of copper. Copper rods or cables running over the roof with points at intervals projecting upward, and branches on each chimney rising a foot or two above, and connecting with the ground at each corner or oftener on a large building, well put up, furnish absolute safety from the electric bolt." "Well put up," in the advice above given, must be made to cover the essential condition of the rods connecting with moist earth. The above remarks and the following correspondence, together with the Editor's reply thereto, will, perhaps, be of interest to the readers of this journal:

From L. M., *Toronto, Ont.*—I noticed in your issue of June 25 an article quoted from the *Journal of Commerce* on metal roofing as a protection against lightning. As this is a question of deep interest to all metal roofers, kindly give your views on the matter and reasons therefor. To me it appears that the Editor of the *Journal of Commerce* draws very broad conclusions in citing that as iron ships have been struck and damaged, hence buildings covered with metal and connected with moist earth by means of copper strips, give no assurance of safety. I can readily understand that iron ships of certain construction may be so injured, for instance, an iron hull, with either wood or iron masts and tarred rope rigging; but I question if there is a case on record where an iron hull with wood masts and cable wire standing gear has been so damaged. In all cases where ships are struck the lightning is first attracted by the masts and is discharged downward by

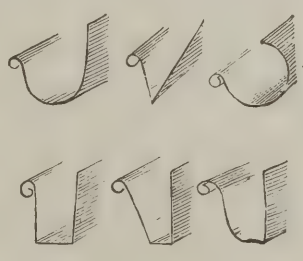
means of the best conductors of electricity, which, in case of rope stays, would be the masts into the hold of the vessel, from whence it would find an outlet to the water in some part where there already exists a leak, small or large, which it would materially increase; but with wood masts and iron stays, I claim that, as iron is a better conductor than wood, it would leave the masts at the cross-trees and be discharged down the stays to the outside of hull and thence into the water, passing off harmless. But, suppose we admit for the sake of argument that no matter what the construction of ships may be they are very liable to this form of mishap, does it prove anything? I claim not, as a building is of an entirely different form and construction. I might compare it to a ship turned bottom upward, intended to keep water out from above instead of below; for, place chimneys on it and you obtain the same results that would be produeed with a metal roof and proper connections of metal with moist earth. In a storm the electric current will strike the highest point and follow down the best conductor to the ground, and as brick and mortar or wood are not as good conductors as metal, it will leave the chimney where it unites with the metal and be carried by it into the ground. Again, under conditions described by the position of the masts in a ship, the tendency would be to conduct the current into the ship instead of outside, while with a building covered with metal, the tendency is to conduct it outside with the best conductor practicable, copper strips, which should not be less than two inches wide. To me, the Editors taking a ship to illustrate a metal covered building does not appear fair and is liable to lead people to false conclusions.

In my own experience, extending over 25 years in metal roofing and building-work, I have seen a number of buildings that were said to have been struck and never saw any injury done them where there was a metal connection between the metal roof and earth, or even with the water in the cistern by the conductor pipes. About a year ago, a residence in Western Ontario (which is roofed and sided up with metal shingles) was struck twice during a storm, but beyond displacing a few bricks in two of the chimneys, not the slighest harm was done.

Note.—We are very happy to furnish our correspondent, in a general way, with our views concerning the protection that metal roofs afford against lightning, and the manner in which they should be connected with the ground. From his criticisms of the paragraph printed in our issue of June 25, it is quite evident that he has misread the quotation. The paragraph does not imply that iron ships are liable to be struck by lightning, but on the other hand intimates that though the accident is known to have happened, the occurrence is a rare one. Metal roofs connected with the ground are spoken of in the same general way. The statement is made that such a roof "might be rent and torn by lightning," but the impression conveyed is that these accidents rarely take place. We cannot agree with him in all he says concerning ships, for we think he has mistaken the manner in which lightning, or electrical discharges, are carried to the earth or water. If the ship be of wood, it is necessary to have copper strips running down the masts and projecting through the planking, so that they shall touch the water directly. In iron ships there is no necessity for carrying conductors, even in the case of wooden masts, beyond the sheathing; for, as soon as the electrical fluid reaches the iron hull it disperses through it and goes off into the water. However, the protection of ships from lightning is not the point at issue, so we will omit all further comment upon cross-trees, stays and rigging and their relative electrical conductivity, and turn our attention for the moment to the subject of roofs. A metal roof unconnected with the earth is in no sense a protection against lightning. The water spouts, in times of rain, form temporary rods, which, undoubtedly serve as a protection to some extent. In such conductors, the electricity which is absorbed by the roof is carried off by the gutters and reaches the ground through the medium of the streams of water issuing from the spouts. Before proceeding further, we would remark that the service done by lightning-rods is not, altogether, that of carrying off a lightning stroke. What the rods also do is to gradually carry away the electricity from the clouds immediately above or around the house, and tend to produce a state of electrical equilibrium between the former and the earth, so that no sudden discharges may take place. Their principal use, however, is to carry away the electricity or rather guide it, when it comes in the manifestation of a flash. We think if a metal roof were provided with points projecting above the chimneys and connecting with it, and also with copper rods or strips running from a number of different points down the side of the house and into water or moist ground, that it would serve as a very efficient lightning conductor. Another point to be borne in mind is, that the rods should not be insulated from the house; but should be fastened to it by staples, or any other means. The old theory that a lightning-rod ought to be run in the manner of a telegraph wire, has long been exploded, and in the best practice at present, no insulation is made use of. In closing our remarks, we would repeat that a metal roof alone, in our opinion, does not in any way affect the liability of a house being struck by lightning, but suitably provided with rods and connections, it is an efficient safeguard.

New Forms of Gutter.

Many of our readers will be interested in learning that Hatten, Galpin & Co., of Binghamton, N. Y., whose long eave trough has been before the public for some time past, have arranged to manufacture long lengths of a variety of forms in addition to the half-round. They inform us that they are now producing these goods in 8 foot lengths of very choice IX and IXX terne and tin plates, copper and galvanized iron. The accompanying profiles show a number of the forms in which these goods are being manufactured. All of them, it will be perceived, have a bead upon the front. Different proportions are given to the different styles varying from a V shaped trough through different forms of O G to troughs more than a half circle in form. This variety of styles and sizes would seem to meet

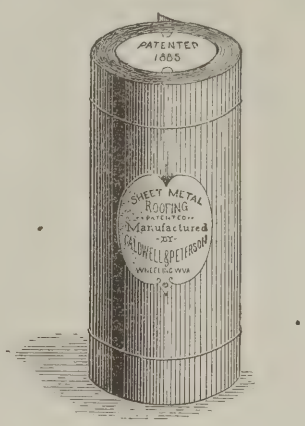


New Forms of 8-Foot Gutters.

every possible demand. We understand that a number of styles in addition to those here shown are made, and that a large stock is kept constantly on hand. This announcement is of interest to all in the trade who occasionally meet a demand for special forms of eave-trough which it is desirable to supply in long lengths without seams.

Caldwell & Peterson's Roofing.

We have referred in the past to some of the patents which have been issued to Caldwell & Peterson, of Wheeling, West Virginia, relating to sheet metal roofing and roofing specialties. We now have the pleasure of laying before our readers a cut of the roofing which they are manufacturing. The cut represents the form in which the packages are put up and arranged for handling as ordinary merchandise by the hardware trade. The cut submitted may be taken to represent either the sheet steel roofing, which they are furnishing, or the continuous tin roofing, which they are also supplying. Sheet steel roofing competes with the iron roofing of other makers that is largely sold throughout the country. In the hands of these manufacturers it has the advantage of being manufactured in the center of a great sheet-metal producing district. The works of Caldwell & Peterson are alongside of some of the principal rolling mills devoted to this kind of trade, and, therefore, they assert that they have special facilities in the way of securing the material that are of great advantage. In the circular before us they state that, while securing the best material at minimum cost, they subject all the metal used to the severest tests, and unhesitatingly reject all imperfect sheets, sending the same back to the mills from which the



Package of Caldwell & Peterson's Metal Roofing.

product was obtained. Referring still to the sheet steel roofing, it is to be said that in laying it is finished with caps and adjustable anchors. These are also arranged in good shape for shipment. The roofing, we are informed, is painted on both sides with best mineral paint and linseed oil, and the rolls are arranged to contain one square. The package makes the material merchantable and transportable without injury. Some very carefully prepared circulars have been issued, showing how this material is to be handled and how the workmen are to proceed in laying the roofing. Referring now to the continuous tin roofing also manufactured by this company and put up in the same form, we learn from one of their circulars that experience has shown them that tin roofs are most defective at the soldered joints, where the fiber is weakened and becomes porous by the strains of expansion and contraction due to the many and great changes of temperature incident to this climate. In order to obviate these difficulties, they have arranged machinery for putting together tin-roofing plates, employing for the purpose a double lock joint, which is not only water tight and storm-proof, but also of a character to yield to the strains of expansion and contraction without breaking or being weakened. This form of roofing is also put up one square to a roll, is painted on one or both sides, as may be desired, and when put into the patent packages is referred to as easily handled either in warerooms or on buildings. The package, we are told, occupies about the space of an ordinary keg of nails. In calculating the quantity of tin to the roll we understand that enough is allowed to admit of making a standing seam 1 inch high when finished. If a smaller seam is used the material will cover proportionately more than a square. We understand that they furnish in this form any grade of roofing tin required. The package in which this roofing is shipped will be understood by the following description: After the tin or the steel roofing, as the case may be, has been put together and painted, it is rolled into small compass, and in each end of the roll there is placed a wooden head and also an outside guard. The head keeps the package in shape, so that in handling it does not become damaged, and when unrolled the strip is smooth and straight. The guards on the ends, consisting of a sheet-iron hook projecting beyond the edges of the roll,

most effectually protect the edges from damage, such as being cut and bent in transportation. Accordingly, when the roofing is unrolled it is in as perfect a condition as when first put up, regardless of the rough usage to which it may be subjected in transportation.

Items.

A RIDGE CAPPING for buildings, to be used with corrugated-iron roofs, has been patented by William H. and Benjamin Powers of the Garry Iron-Roofing Company, of Cleveland, Ohio. The saddle of the ridging is struck up in a way to correspond with the corrugations of the metal, over which it is placed in use. The roll is in the form of a separate tube or cylinder, and is attached to the saddle by means of riveting. One of the advantages following the use of such a ridging is the sharp lines given to the bead.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, of Cincinnati, are preparing colored illustrations of their roofing work, some 5 x 8 inches in size. Proof sheets that we have examined are very handsome. The illustrations will show various forms of application of ornamental sheet-iron work for decorating ceilings, &c. The designs embrace a large variety of work, and will, no doubt, prove an attractive and valuable advertisement.

AT THE OLD BANGOR QUARRY last Thursday afternoon, says a recent issue of the *Bangor Observer*, 12 holes were loaded with powder, preparatory to making a blast, 10 kegs of powder being used for the purpose. The electric battery which is used to fire the blasts being out of order, a man was sent to borrow one at the North Bangor quarry. While the man was absent, a thunder storm came up and a bolt of lightning ignited the blasts and discharged every one. The work was done as neatly as though by the aid of the battery. Had it not been for this fortunate stroke of lightning, about $40 worth of powder would have been spoiled and the workmen compelled to do their work all over.

WE ARE IN RECEIPT of a current circular issued by J. H. Eller & Co., of Canton, Ohio, in which illustrations appear of the lock-seam roofing that this firm is manufacturing under J. H. Eller's patent. The members of this firm have had long experience in the roofing business, and in putting upon the market the specialty which they are manufacturing they approach the trade with a long acquaintance with what is required. The circular contains a general description of a roof with a view of workmen engaged in laying it.

THE BODINE ROOFING COMPANY, of Mansfield, Ohio, are experiencing a very lively trade at the present time We understand that they are nearly 1000 squares behind their orders, and that they are about to erect additional buildings on the grounds owned by them adjoining the Baltimore and Ohio Railway, so as to secure the additional manufacturing facilities which they need.

Specification Formulas for Steam and Water Heating.

Mr. John J. Hogan, M. E., 87 Centre street, New York, has prepared a series of specification formulas or blanks designed to facilitate the work of house owners, architects and contractors in preparing estimates on steam and hot water heating. The series of specifications comprise 12 different formulas, 10 of which are adapted to steam heating and two to water heating, the several ones being designed to meet the varying requirements of different specifica- tions. The following is an index of the sections, a greater or less number of which the several formulas include, the numerals referring to steam and the letters to water heating:

Section No. 1. General conditions, steam apparatus.

Sec. No. 2. Drawings.

Sec. No. 3. Construction, principles and method.

Sec. No. 4. Tubular boiler, iron work, brick setting.

Sec. No. 5. Special boiler, ironwork, brickwork and smoke flue.

Sec. No. 6. Boiler trimmings.

Sec. No. 7. Smoke flue and damper regulator.

Sec. No. 8. Low pressure damper regulator, automatic water feeder and connections.

Sec. No. 9. Feed and return pump, pipes, valves and connections and foundation.

Sec. No. 10. House and elevator pumps, pipes, valves and connections and foundations.

Sec. No. 11. Pump governor, boiler water line governor and connections.

Sec. No. 12. Return steam traps, receiver and connections.

Sec. No. 13. Water boiler for domestic purposes, flow, return and supply connections.

Sec. No. 14. Feed water heater, steam traps, blow-off tank and connections.

Sec. No. 15. Main waste-pipes in cellar.

Sec. No. 16. Main exhaust-pipes, back pressure valve, condenser and oil traps.

Sec. No. 17. Radiation, coils, screens, marble tops, safes, ducts to direct indirect radiators.

Sec. No. 18. Casings to indirect radiators, warm air registers, warm air pipes, iron lathing and cold air ducts.

Sec. No. 19. Main steam pipes.

Sec. No. 20. Low and high pressure steam pipes.

Sec. No. 21. Main return, vertical steam, return and waste pipes, valves and air emission appliances.

Sec. No. 22. Pressure regulator.

Sec. No. 23. Thimbles, sleeves, Finishing plates, hangers, supports, pipe covering, decorating, bronzing and painting.

Sec. No. 24. Ventilation.

Sec. No. 25. Synopsis of materials.

Sec. A. General conditions, water apparatus.

Sec. B. Drawings.

Sec. C. Construction, principles and method.

Sec. D. Boiler, castings, bricksetting and smoke flue.

Sec. E. Radiation, coils, marble tops, screens and safes.

Sec. F. Casings for indirect radiators, warm air registers, warm air pipes, indirect radiating surface and cold air ducts.

Sec. G. Pipes and fitttings, expansion tank, valves, air emission appliances, thermometers, thimbles, sleeves, finishing plates, hangers, supports, pipe covering decorating, bronzing and painting.

Sec H. Ventilation.

Sec. I. Synopsis of materials.

To illustrate more fully the scope of these formulas, we will, for instance, describe Formula No. 1, adapted to special boiler, low pressure, direct radiation, gravity return. It contains Sections 1, 2, 3, 5, 6, 8, 17, 19, 21, 23, 24 and 25, the contents of which may be understood by referring to the above index to sections. Again, Formula No. 6 is for tubular boiler, high and low pressure, direct and indirect radiation, return by steam trap, and contains the following sections: 1, 2, 3, 4, 6, 7, 12, 15, 17, 18, 19, 20, 21, 22, 23, 24 and 25. Formula No. 10 is for tubular and special boiler, high and low pressure, direct and indirect radiation, heating by exhaust and live steam, water boiler, blow-off tank, return by trap or pump. This formula—the most complete for steam—comprises all the sections, 1 to 25 inclusive. The water formulas, No. 11 and No. 12, are as follows: No. 11, special boiler, low pressure, direct radiation, gravity circulation; No. 12, special boiler, low pressure, direct and indirect radiator, gravity circulation. The latter contains Sections A to I inclusive and the former the same, with the exception of Section F. The formulas are neatly printed on linen paper, are some 13½ x 8½ inches in size, and are bound in flexible paper covers. No. 1 contains 36 pages, and No. 10 contains 72 pages, the intermediate numbers varying in size according to the sections they include.

The advantages of the use of these formulas to the architect are numerous when a heating engineer is not called on to fill in the specification complete and be responsible for the working of the apparatus. The architect can give the total cubic space to be heated, the date when the work has to be completed; he can state if the heating contractor shall provide for the cutting of floors, walls or partitions; the temperature desired in the apartments may be given by him. The highest pressure at which such an apparatus is to be worked can also be mentioned. If temporary heating is required before the completion of the work, and range the drawings to which reference is made. The kind of boiler, without its exact size, but the clause is prepared in which the architect can state the amount of work or steam supply the boiler is to be capable of. The class of radiation and the make of radiators; the number, position and sizes of rooms, with aspect and number of windows, can be readily filled in. The number, style and finish of registers and hot-air pipes, thus leaving the contractor free to put in his own dimensions and sizes, and giving each contractor the assurance that by filling in his part of the formulas his estimate and what he proposes to furnish will be fairly and readily compared with his competitors' offers. The more fully the contractor describes what he proposes to undertake the more readily are his prices or estimates appreciated. With the present system of one specification there is a great difficulty in ascertaining what is intended to be supplied by each contractor, whereas with the use of the formulas each contractor definitely states, and in a uniform manner, what he proposes to do for the amount of his estimate. In the proposed system of specifications, when filled in by a heating engineer, it presents not only a series of specifications, but a bill of quantities of the materials required. Thus every part of the apparatus is definitely described, relieving the architect and contractor of a large share of work at present unremunerated, and securing to the owner a correct and exact bid on his requirements. As competition increases the heating engineer will be more in demand and the bill of quantities will be asked for by all first class contractors. It is also evident from the often-repeated large discrepancies of from 50 to 30 per cent. between bids on the same so-called specifications, that contractors will demand proper bills of quantities, as they will soon get tired of bidding uselessly on almost unknown quantities of work, which the present uniform and incomplete documents call specifications afford. The contractors for buildings and carpentry, as well as for heating plants, at present spend much of their time endeavoring to ascertain, even approximately, the quantities of materials on which they are to bid, thus wasting valuable time on work which should be done and prepared for them by the bill of quantity taken or surveyor of quantities of the consulting engineer.

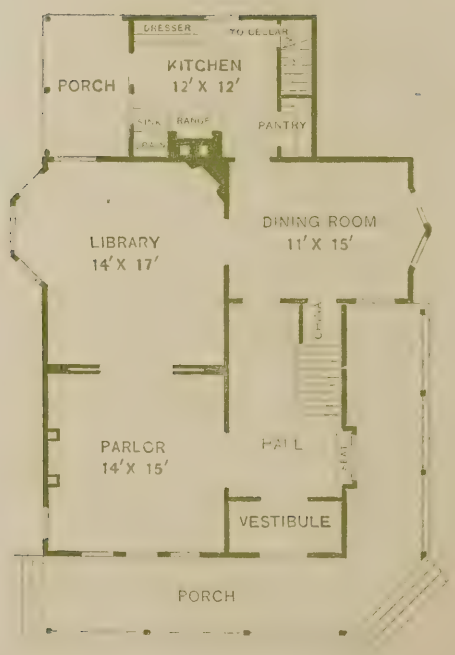
The architect is seldom a specialist in such matters, and when called upon to prepare and fill in blanks of this nature, he usually commits many errors, or follows the more expensive plan of having the work done by a heating engineer or other competent person. His education fits him for drawing up general building specifications, and constant practice in his profession makes the task an easy and familiar one, but in the department of heating there are few architects, we venture to say, who consider themselves masters of its intricate details. Besides relieving the architect of the labor of writing specifications, the printed description of these formulas given in Mr. Hogan's circulars supplies a list of the different systems of heating, by which ready comparison can be made and the most suitable one selected. Another point which we would touch upon in closing this review is the uniformity, so far as order in specifying is concerned, that the use of the formulas will insure. Instead of having to compare specifications arranged according to different plans, the blanks, being duplicate in form and arrangement, will permit careful comparison being rapidly made.

A colossal Statue of Liberty 40 feet in hight and sculptured from bluestone will be erected on a peak near San Francisco 1000 feet above the sea, through the munificence of Adolph Sutro, of tunnel fame. One arm will support an electric torch visible 20 miles at sea.

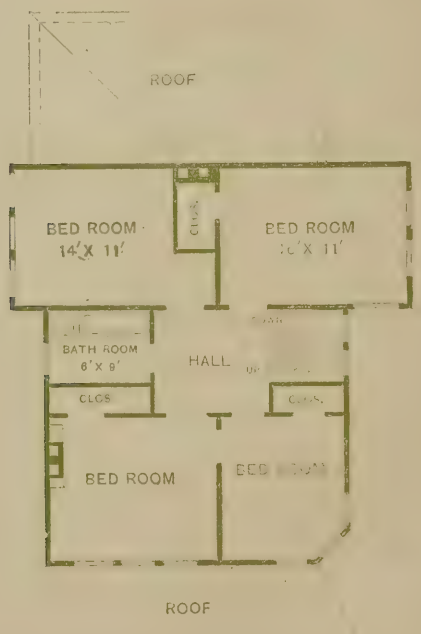
LIBRARY INTERIOR, DESIGNED BY SIDNEY MITCHELL, EDINBURGH.

Front Elevation of House. Designed by Miss Minnie M. Packer, Philadelphia.

Scale 1-8 Inch to the Foot.



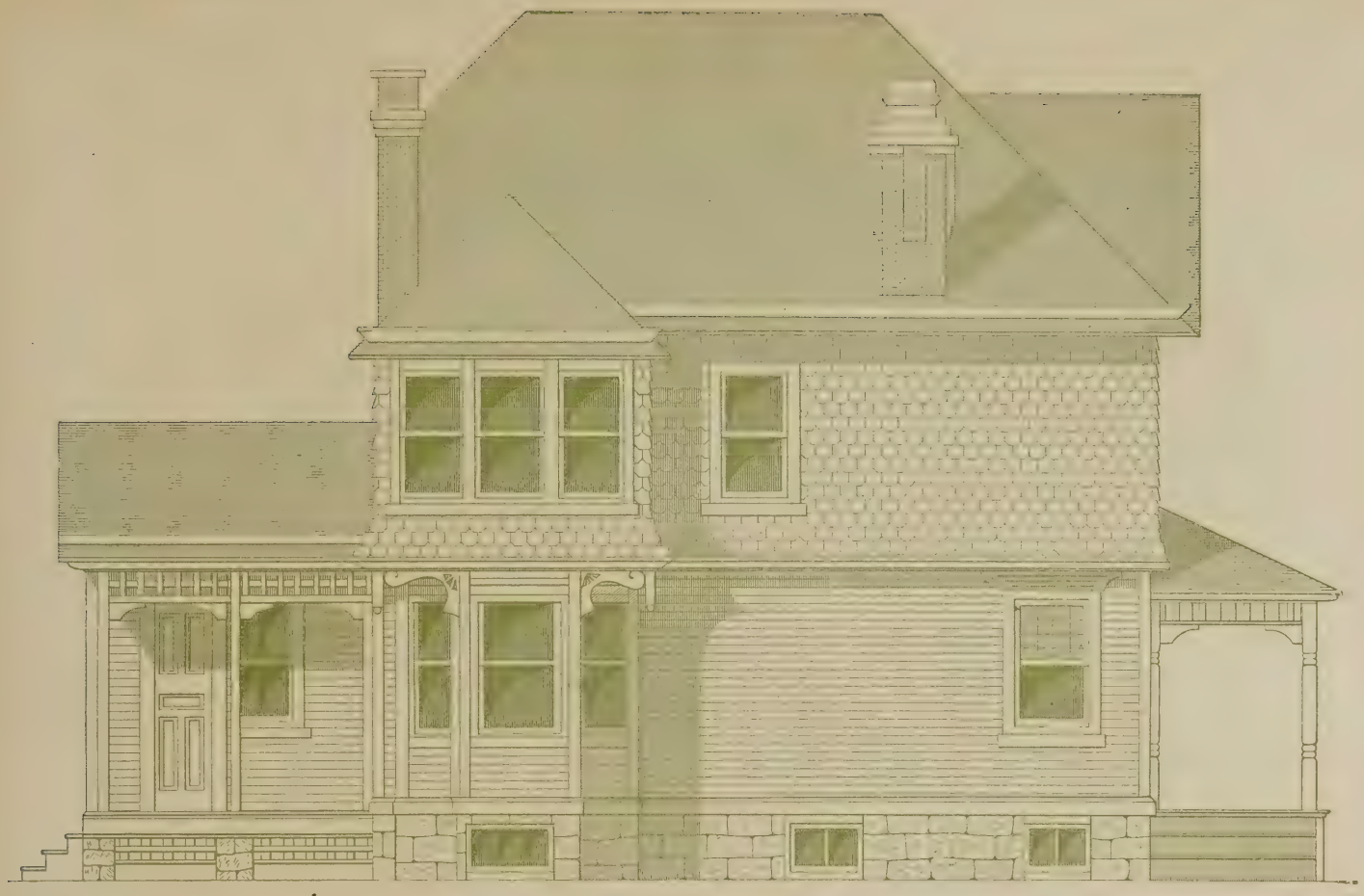
FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

Floor Plans, Scale 1-16 Inch to the Foot.

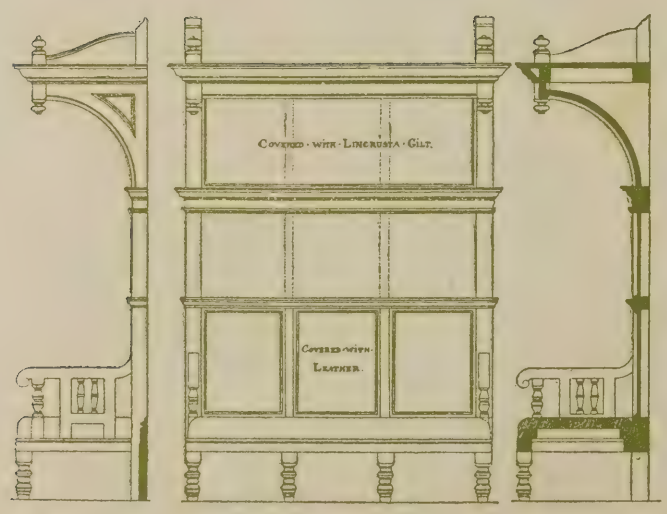
For Foundations and Attic Plans, See page 197.



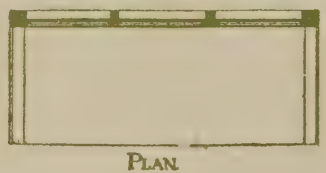
Side Elevations of House Study, by Miss Minnie M. Packer, Philadelphia.

Scale 1-8 Inch to the Foot.

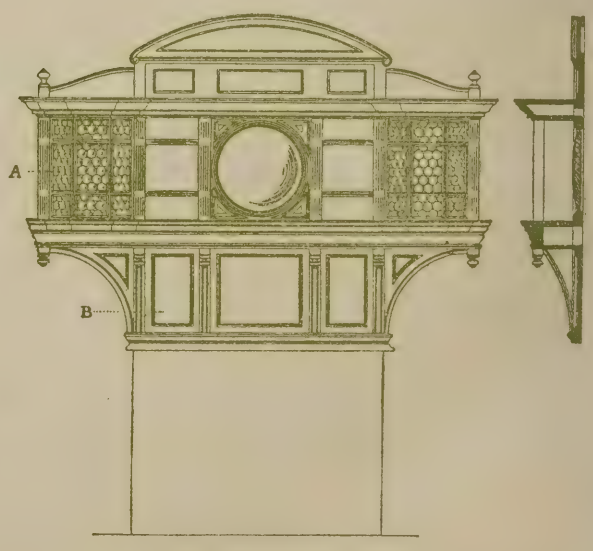
SIDEBOARD, DESIGNED BY R. A. BRIGGS, ARCHITECT.



SIDE · ELEVATION. FRONT · ELEVATION. SECTION.



PLAN.



FRONT · ELEVATION. SECTION.

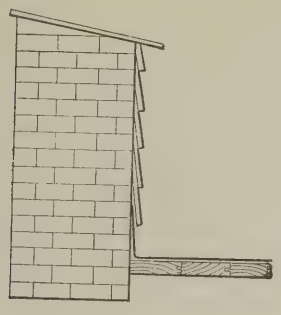
HALF · PLAN · AT · A. HALF · PLAN · AT · B.

SEAT FOR RECESS AND HANGING CABINET, DESIGNED BY R. A. BRIGGS.

CORRESPONDENCE.

Some Curious Roofing Jobs.

From T., *Iowa.*—Some years ago the writer had to repair the roof of a hotel. The worst leaks were over a nice room that could only be used when it was known there would be no rain. Great pains were taken that all of the leaks in the roof were found and stopped. The night after the roof had been pronounced all right and tight there was a hard rain. The next morning a visit was paid to the hotel to find out if the roof was all right, and I was informed that the roof over the room in question had leaked as badly as before. Another visit was paid to the roof. There was a high fire-wall, and the top of it was covered with boards, so as to form a roof to keep off the rain. Then the inside of the fire-wall was covered with clapboards, to keep the brick warm or dry, just which is not known. Upon removing some of the lower clapboards the trouble was discovered. The tinner who put on the (tin) roof had used lead flashings, which extended up about 6 inches. Where the lead extended into the joint in the brick was where the trouble was, as the lead had become loose; there was a crack about 10 feet long that would let in quite a supply of water. The roof of fire wall was about even with the clapboards, so when it rained, and the wind was from the right direction, the water would be blown in behind the clapboards; then all it had to do was to follow the brick until it came to the crack between the lead flashing and the brick, and then run into the building. The roof was repaired by putting in tin flashings in place of the lead, and that was the last of



Curious Roofing Jobs.—Fig. 1.—*The Water Ran Behind the Clapboards and Under the Tin.*

the trouble. While it is hardly to be expected that the reader will ever encounter a similar job, yet the above incident shows how easy it is for a person to be deceived regarding the cause of a roof leaking. A person who goes on a roof to see where it leaks is too apt to look at the roof and not enough at the surroundings. Where the roof joins the brick wall should be looked to, as well as the lower edge of the roof, to see that the water does not run under the edge, and thus into the building. The flashings around chimneys are often put in such a shape that a leak can occur. When the roof is covered with shingles the shingle tins may not be lapped enough but that the rain may be blown under them. Wooden shingles are rough, and when they become wet they swell, so it is difficult for the water to be blown under them, but tin is smooth, and the wind and capillary attraction combined may cause a leak. The piece of tin above the chimney may not be large enough or extend far enough up the roof so the water will not back up and over the edge of the tin, or the nails that are driven through the shingles may have been driven through the tin (but not so as to show) and cause a leak. While such cases may not happen very often, yet when part of the expert mechanics in the town have been called to doctor the roof without avail the tinner that fixes the leak may be said to have added a (tin) feather to his cap.

Another curious job of roof repairing was done by the writer. There was a flat tin roof that received the water from a shingle roof. Under the flat tin roof was a printing office, and when there was a heavy rain the printers were obliged to set wash-tubs to catch the water, but even then the little square boxes in which the types were kept in would become filled with water. Fig. 3 is intended to show the trouble with this roof. The tin extended under the shingles far enough, but when the shingles were put on they were put very near the tin roof and nailed so low down that the water found no difficulty in

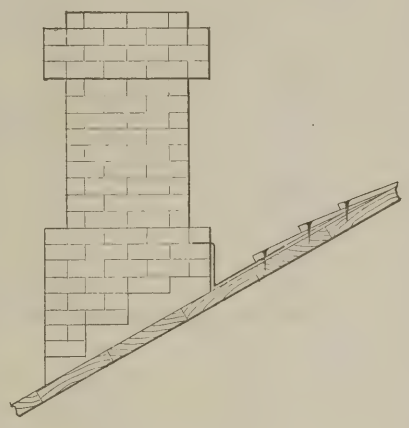


Fig. 2.—*Nails Driven Through the Tin Above the Chimney Cause a Leak.*

running under and into the building. This roof was repaired by taking off three or four rows of shingles, soldering the nail holes in the tin, and having the tin extend far enough up the roof so the water could not get under the tin. A number of mechanics had looked at this job, but could not see where the trouble was. If they had only taken up a few rows of shingles, any one could have found the leaks, of which there were over 100.

Inside Sheeting.

From H. G., *Medina, Ohio*—In the August number of *Carpentry and Building* there was published a communication from "S. T. B.," of Wellington, Ohio, with regard to sheeting a building. He thinks that sheeting on the inside is not right; I claim that sheeting on the inside is the best, and if you will allow me the space I will attempt to tell why. Siding will always get wet, more or less, on the inside, as every one may notice, after a rain. Now, when siding is laid over sheeting, it gets wet just the same; and, accordingly, there is not much chance for it to dry out. In time the sheeting, as well as the siding, will rot; while,

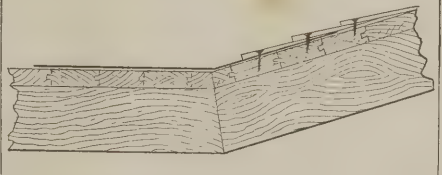
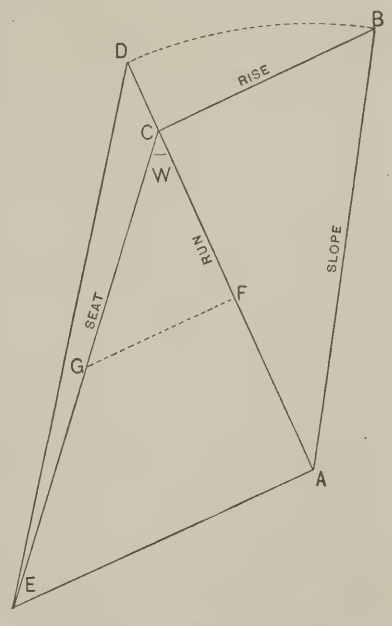


Fig. 3.—*Tin Joined to Shingle Roof, Nails Driven Through the Shingles and the Tin Cause a Leak.*

on the contrary, if the sheeting were on the inside it would not get wet and would have a much better chance to dry out. I claim that sheeting on the inside is better for the plastering. By putting lath up and down the right distance apart, against which to nail the lath for plastering, there is provided a space for the plaster to clinch. It is of such shape that less plaster is wasted by dropping off at the back than is usual with the ordinary plan. Besides, a more solid wall is secured by this means. I once built a house and sheeted it on the outside. Ten years after I built an addition to the house and was obliged to take off some of the siding in order to join the two together. I found the sheeting and siding so rotten that I could pick them to pieces with my fingers. Thereupon the owner of the building had it stripped of both siding and sheeting. In doing this work we found a great deal of it so rotten that it was almost impossible to get a piece off in a complete length.

Problem in Oblique Bevels.

From FRED. LASCY, *San Francisco, Cal.*—Given the run AC, the rise CB, and the slope length BA of a stick of rectangular timber, which butts obliquely at the upper end against a vertical plane of indefinite length, and whose seat line = CE. Angle between this seat and the given run = W, which may be any angle whatever. Required the side bevel on the top face of the stick at the point B to fit this end of the stick against the vertical plane. First draw AE at right angles to the run, make AD = slope and draw DE. The required side bevel = EDA. Demonstration. Let the triangle EDA revolve on AE as on a hinge, when the vertex D reaches the required hight of the rise, the triangle EDA will stand directly over the triangle ECA, the line ED will coincide with the vertical plane; the line DA will coincide with the top center line of the stick. By calculation, tan. side bevel = $\frac{\text{run, tan. W,}}{\text{slope.}}$ when W = 45°, tan W = unity. By the steel square on a line. Place AE (run, tan. W) on the blade, place the slope line on the tongue, mark along the tongue for the side bevel. When W is an obtuse angle, it will be more convenient to obtain the length of AE in the following manner: From *f* the



Prob'em in Oblique Bevels.

center point of the run draw *fg* at right angles to the run, then AD = twice *fg*. If the stick should at its lower end butt obliquely against a vertical plane, the side bevel is obtained in precisely the same way as given. By this method we may obtain the side bevel at the lower end of certain jack rafters, making planers and rafting moldings. The other bevels at the top and bottom of the stick do not require any remarks.

Length of Rafter.

From W. E. W., *Blue Mound, Kan.*—I desire to refer to the method of "M. A. W.," of Evanston, Ill., published in the July issue of *Carpentry and Building*, for getting the length of rafters of roof of one third pitch. Taking his first example of a building 22 feet wide, his method gives 13 feet 2 inches. This answer is incorrect, the true length being 13 feet $2\frac{6}{10}$ inches. In other widths of buildings his method will depart from a true result from 1 to 2 inches, according to circumstances. If your correspondent will multiply his 22 feet by $\frac{6}{10}$, the answer will be $13\frac{2}{10}$ feet. Now, reducing his $\frac{2}{10}$ feet to inches by multiplying

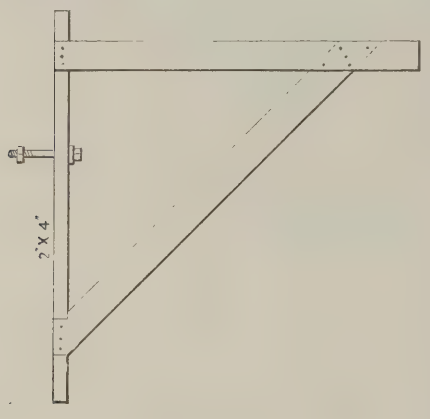
by 12, he will have $2\frac{4}{10}$ inches. This rule for almost all purposes will be found satisfactory.

Hardening Plaster Molds.

From D. O. C., *Philadelphia.*—One of your correspondents asks how to harden plaster molds. In making plaster casts of deformities we always add some table salt to the water before putting in the plaster of paris. Just how much salt is required I do not know. I am like the old woman whose recipe was a cup of water and a pinch of salt. This, of course, is very definite. I judge, however, that about a teaspoonful of salt to a pint of water would be right.

Cornices and Stagings.

From E. P., *Passaic, N. J.*—In this town there is a bracket used for supporting staging which is exceedingly neat, cheap and serviceable, and may be of use to some of your readers. It is made by using a piece of scantling, two boards and a $\frac{5}{8}$ bolt and nut. I send a little sketch to show just how it goes together. For all kinds of wooden buildings it is the best thing in use in these parts. While it may not be new in some portions of the country, there is no doubt that there are many persons who never heard of it. The brace is let into the upright piece and so comes flush with the face of the scantling. The horizontal part, like the brace, is a piece of 1-inch board, 6 or 8 inches wide. When it is to be put in



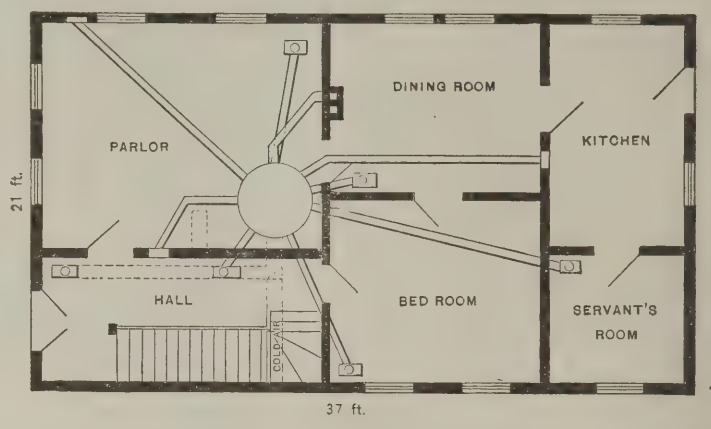
Staging Bracket Described by E. P.

place a hole is bored through the sheeting of the building and the bolt put through the holes. A piece of board a couple of feet long with a hole put through it is put under the head of the bolt as a sort of washer and to distribute the strain a little. When the carpenters are done with the brackets they are taken away for the next job. They have the great advantage of being easily shifted, are safe, cheap to make, and convenient to adjust. For window stagings they are rather better than some of the forms shown in the article mentioned. They might be made a little differently and furnished with longer bolts and a couple of extra pieces, and so adapted to almost every position where a stage is needed.

The disadvantages of staging made on the spot from "any scraps" that may be at hand is that men will not take pains to make the work safe. It is to often a "lick and a promise." A nail is driven just to hold and the man forgets in his hurry to put in the others, or one may break and the whole depend upon the one that remains. Every man who has had much experience can remember cleats which have held with but a single nail, and others which have "let go" and sent many a poor fellow home with a broken head or limbs. A little careful work would have saved the accident. With the brackets all made in the shop beforehand many of these dangers are saved while the work is done at odd times, and much time saved when the job is actually in hand. Another important saving is the diminished time necessary to put a scaffold in place at any given point on a building. There is no skirmishing around to find suitable scraps, and no wasting of good stuff because the scraps cannot be found.

Putting Up Hot-Air Furnaces

From C. T.—When one is required to measure an old house for the heating pipes, it is convenient to make a scale drawing of the ground floor of the house, then the distance the various registers are from any known point can be marked on the plan. After this has been done it is easy to decide where the furnace is to stand, and the pipes



Putting Up Hot-Air Furnaces.—Fig. 1.—Plan of House Showing Method of Representing Pipes and Register Boxes.

can be drawn, and their length determined by a rule, using the same scale as was used to make the drawing. For the registers in the first story, a square, with a circle inside, to represent the pipe can be used, and for the stacks or partition pipes, figures the shape of the stack. As an illustration of the above way, Fig. 1 has been drawn. It is not intended to be a fine drawing, only such as a person would be expected to make at the building, and simply to show the location of the various registers and stacks, some of which have been located in rather strange places it must be admitted. When once a correct scale drawing of a house has been made any measures desired can be taken from the drawing as well as the angles of the various elbows. Besides this, one who has not seen the house can form a better idea of the building, as every distance is in proportion. The scale to be used in making such a drawing can be best determined by the size of the paper or board that the drawing is to be made on. When architect's drawings are to be had a copy can be made by laying the plan on a paper or board, pricking through the various floor elbows, draw a line through the center of the furnace at right angles to the length of the house (Fig. 2). By setting one leg of the dividers in the center of the furnace and extending the other to the various registers, and marking arcs to the center line, the relative distance from the furnace to this line will be procured, and by dropping lines down below the plan and drawing the top of the furnace in its proper position in relation to the floor the pipes can be drawn so as to give their proper length and the bevels of the various elbows. This has been done in Fig. 2, where a side view of all the pipes has been given. In the above drawings the registers are located in various places, for the sake of variety in illustration, and not as they would be if it was a real case of heating a house.

To determine the proper size of furnace to use to properly heat a house, much depends on what part of the country the house is located in. It is supposed to be much colder in Maine than in Florida, and the furnace that would do for one would not do for the other. When a person does not possess the experience with a particular furnace to determine this very important point, the best way is to give a description of the house to the manufacturer or agent of the furnace, who, from greater experience, is better able to determine. Even then there is no danger in taking the next size larger than has been recommended. When the pipes pass through wooden partitions, there should be

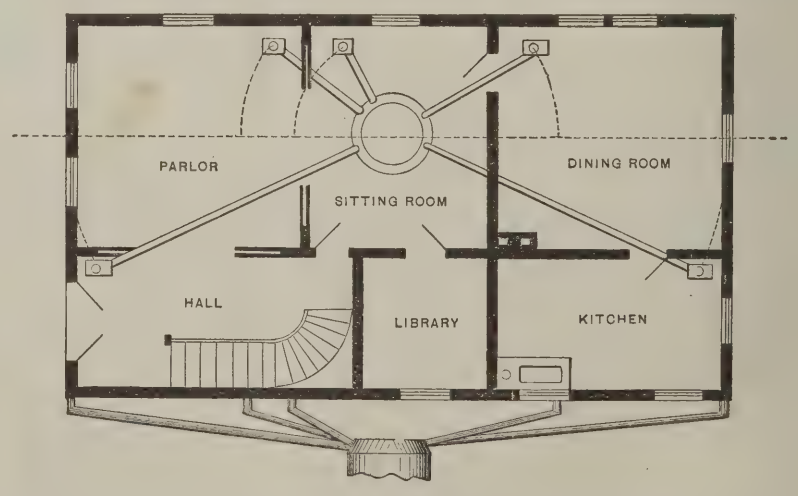
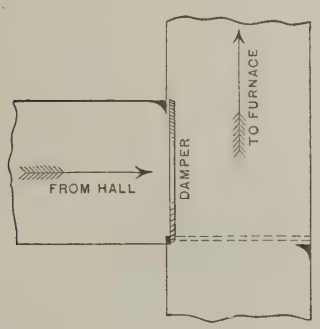


Fig. 2.—Plan of Furnace and Pipes, Showing Method of Determining Lengths.—Side View of Top of Furnace is Shown Below the Plan.

to get the necessary points, and then drawing the connecting lines. If possible to do so, the furnace should be so located that the different pipes will be of an equal length, or having the pipes leading to the north and west rooms the shortest. It frequently happens that the basement is so arranged that the furnace is restricted to a few places for location, then the locater must do the best he can. When it is desired to get the angles of an air space between. Sometimes a sheet of tin with a hole large enough for the pipe to pass through will do. A regular safe will do better, when the partition is double. When a new house is being put up, and pipes are to pass through partitions, it is a good plan to put in thimbles for the pipes to pass through; this saves cutting holes in the brick walls. For the cold air supply, ducts are sometimes used. When made of

tileing, and the joints made tight with cement, it is not a very bad way and very convenient, as it does not show in the cellar; but there are a number of objections to this method. In the winter the snow is apt to fill up the outer opening, so the air cannot enter. Being below the floor, the duct is apt to serve as a drain for all surface water, and animals may crawl in and die, which would cause the inmates of the house to think the furnace was leaking gas, or something worse. Sometimes it is convenient to bring the cold-air box along the ceiling until near the furnace, then down, so as to connect with opening made in the side of furnace covering for the purpose, or the box can be brought from the opening in wall to the cellar bottom and then run to the furnace. It would be hard to give a general rule that would apply in all cases. One should be guided by circumstances. Some prefer to bring the cold air into a room provided for the purpose, and then into the furnace. It is claimed that the draft of the pipes is less affected by the direction of the wind. Force pumps hsve an air chamber, to cause a steady flow of water, and it might be that an air chamber would operate the same way with a furnace. There are others who advocate the bringing of the cold air from the top of the house through a suitable pipe, as the upper air is purer than that nearer the ground. How the smoke from neighboring chimneys is to be prevented from being "taken in" is hard to explain. A plan adopted by some is to run the cold-air box to the furnace, then put a large register in the hall and run a wooden box from this to the cold air box. Where the two boxes join, a damper is to be put in so the air can be taken from the hall or from outdoors. This way will work well and save heat, but there



Putting up Hot-Air Furnaces.—Fig. 3.—Box and Damper.

is danger that the outer box will be kept closed too much, so a sufficient supply of cold and fresh air will not be used. In Fig. 1 the dotted lines show this arrangement of the cold-air box, and Fig. 3. an enlarged view of box and damper.

It must be evident to any one that a furnace will "draw" better when there is a chance for the air in a house to escape. Under these conditions it is easier for the fresh hot air to enter. This can be done by having a fireplace in one of the lower rooms, or, where there is no fireplace possible, put in an open-front stove, of which many elegant designs are made at present. In cases where a furnace does not throw up the desired amount of heat, it would be a good plan to try the open stove as a remedy. The cold-air box should be one-half or two-thirds the size of the hot-air pipes, and, when it can be done, located on the north or west sides of the house. When a furnace does not heat properly, examine the fire and see if the fire-pot is not half full of clinkers. If the furnace does not heat up the house quick enough in the morning, the reason may be that the ashes and clinkers are not removed, and that so much coal is put on at once that it takes all of the heat of the fire to warm the coal. During this operation very little heat can be given off to the rooms. If the coal is as cold as ice it cannot be expected to do much heating before it gets warm. It is a good plan to have dampers in all of the pipes, then if the heat is not required in any particular room it can be turned off, and if any pipe heats more than is desired it can have a "damper" put to its ardor by turning the damper part way. As this appliance is simply to check the draft any material that will not burn or melt will do to make it of.

Tops, bonnets or hoods are made flaring and straight. The straight ones, when the collars are placed on top, give the heated air

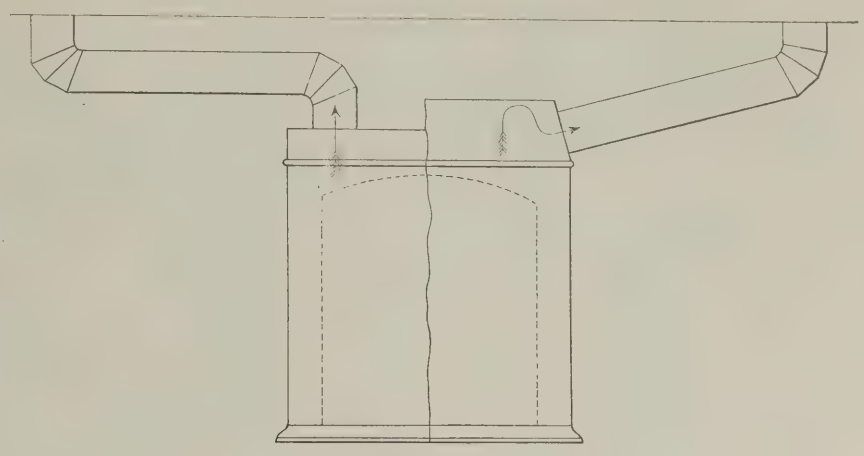


Fig. 4.—Diagram Illustrating Two Styles of Bonnets.—The One on the Left May be Made Low as Here Shown, or of the Same Hight as the One on the Right.

an opportunity of going directly up, and as the elbow is supposed to be made of three or four pieces, the air meets with very little resistance in its upward course, and the elbow on top can point in any direction, without another pipe is in the way. With a "pitched" top bonnet the air first strikes against the top, then has to change its direction to go up the pipe. The one advantage possessed by this form is that for a furnace of given hight it does not take up as much room, and so can be placed in a lower basement, as shown by Fig. 4, where the two styles are drawn together. Fig. 5 shows how much more convenient it is to take the pipes out of a "flat top" bonnet than out of "pitched top," especially when the pipes run parallel to each other. Furnaces with galvanized iron casings, or "portable," as they are sometimes called, are sometimes lined with tin or sheet iron; as the tin is bright it is supposed to keep the heat better than iron. As the doors of cook stoves are always lined with tin it is a sign that it is the best. When the lining is corrugated, so an air space is left between the casing, it will be more apt to retain the heat.

How far a horizontal pipe can be run and have it operate properly would be hard to state, as so much depends on circumstances. Once the writer put up a furnace in a house where all of the pipes leading to the first story were double. A 9-inch pipe would have an 11 inch pipe on the outside of it as a jacket. One of the pipes was very long (the one that went to the front hall). All of the pipes connected with this job heated as near alike as could be desired. This was the only job with double pipes the writer ever put up, so can only give the case for what it is worth. When the measures or estimate for a furnace job is to be made from the architect's plans and the furnace is not located, a circle or shape of the furnace can be marked on the plan, and the length of the various pipes determined. If the scale is ¼ inch to the foot, then, of course, each ¼ inch will represent a foot. A copy of the pipes on the plan can be made by placing a sheet of carbon paper on a sheet of plain paper, placing the plan over, and then marking with a blunt instrument over the pipes, &c., when a good copy will be the result. Or tracing paper can be placed over the plan and the pipes marked off. When there are pipes leading to the second story or second and third stories, care is to be taken to notice if one partition is over the other, so as to know if there are to be offsets in the pipes or not, as these make almost as much work as a stack. A person who has to figure furnace-work from plans should become familiar with them, so as to understand them, or mistakes will be made that will have a bad affect on the profits of the job.

When the basement is to be lathed and plastered, plaster rings or collars are put in before the lathing is done. They are simply hoops of tin one and a quarter inches wide, with a burr turned on each end, and strips of locked tin riveted on each side, so they can be nailed to the joist; then the lather puts the ends of the lath against the collars, and when the plastering is done, a nice round hole is left, where the heating-pipe is to go through. The strips of tin for the collars can be cut one and one fourth inch longer than the diameter of the heating-pipe that is to go through them. If required, these collars can be made double, so an air space will be left between pipe and lathing. If a furnace is large enough to heat a house, it would make very little difference how many pipes are taken from the furnace—providing none of the pipes are run out of doors. In setting up a furnace, care is to be taken that it rests on a good foundation, and, in case there is frost in the ground, that the furnace will not tip when the ground thaws out. The size of foundation can be determined from the bottom ring (when portable), and if to be set in brick, follow the directions that should accompany every furnace. When the basement is not deep enough for the furnace, an excavation should be made, and if there is danger of surface water, put

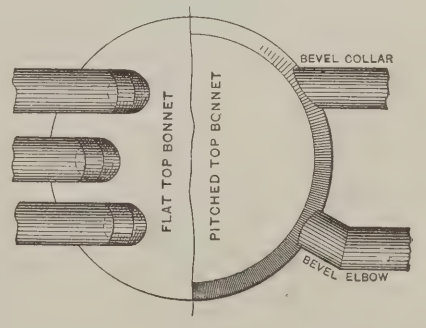


Fig. 5.—Plan Showing How Pipes May be Taken Out of the Two Styles of Bonnets.

in a box covered with lead and lay in enough brick to protect the boards of the box from the heat. See that all of the joints are made tight when the furnace is set up; fireclay and sand make a good cement, or use asbestos cement, which is better. The doors can be made gas-tight by using a cement made of linseed oil and iron mineral. When the furnace is to be set in brick, the bottom of the pipes should be level with the top of the furnace, and trimmed off level with the face of the wall. It is a good plan to have the collar the smoke pipe passes through larger than the smoke pipe, and a stopper put in. A hole can be cut for the

pipe, and then if the furnace should settle or raise, the pipe can be adjusted without disturbing the brickwork. There should be a space of 2 feet beween the top of furnace casing or brickwork and the ceiling. Is is a good plan to have the ceiling of furnace-room covered with lath and plaster. This is a great protection from fire from the top of the furnace. Houses have been set on fire by the top of the furnace being too near the ceiling.

Before connecting the smoke-pipe with the chimney, see that the flue is clear. The writer has taken a bushel of dirt and bricks out of an old chimney. It is a good plan to tie a weight to a string and let it down from the top of the chimney, so as to know everything is all right. Another way is to light a piece of paper and hold it in the flue. When a fire is lighted in a furnace (or stove for that matter) and it does not work all right, a bad impression is formed in the people's minds that is sometimes very hard to remove. There is nothing like starting right. When the fall comes, with the cool weather that all have been longing for so long, then is the time to watch a new furnace and see that everything goes well. There may be some trouble that the householder may not want to speak about, but which may prevent that hearty endorsement of the furnace that would be the foundation of future sales. A word to the wise, &c.

Regarding the sizes of registers and pipes for different sized rooms, the following is taken from the catalogue of the Boynton Furnace Company:

In public halls or buildings where but a single register is required, take the hot-air pipes from the top of the furnace and use register without valves. The sizes of pipes and registers requisite for the successful operation of any furnace is a matter requiring the best judgment, and should be determined by the size, position, and distance from the furnace of the spaces to be heated, and cannot be governed by any fixed rule.

We usually recommend for rooms of ordinary hight as follows:

Room on first floor, 12 x 14 feet, should have 8-inch pipe with 8 x 12 register.

Room on first floor, 12 x 18 feet, should have 9-inch pipe with 9 x 12 register.

Room on first floor, 16 x 20 feet, should have 10-inch pipe with 10 x 14 register.

Room on second floor, 8 x 12 feet, should have 7 inch pipe with 8 x 10 register.

Room on second floor, 10 x 16 feet, should have 8-inch pipe with 9 x 12 register.

Room on second floor, 16 x 12 feet, should have 9-inch pipe with 10 x 14 register.

Medium-size halls should have 10-inch pipe with 10 x 14 register.

Large-size halls should have 12-inch pipe with 12 x 15 register.

When oval or flat pipes are built in the walls of an ordinary three or four story city house, the basement room and parlors should have independent pipes; second, third and fourth story rooms can be warmed by a single line of pipe reduced in size over each register, viz.:

A house 18 or 20 x 45 or 50 should have a separate pipe, 4 x 16 to basement.

A house 18 or 20 x 45 or 50 should have a separate pipe, 4 x 16 to each parlor.

A house 18 or 20 x 45 or 50 should have one line, 4 x 18 to second story, reduced to 4 x 14 for third story, reduced to 4 x 9 for fourth story.

A house, three story, 20 x 45 or 50 should have one line, 4 x 16 to second story, reduced to 4 x 9 for third story.

The above sizes to be varied according to the size of house and the general division of the interior space.

4 x 24 pipe in the wall should have 12-inch pipe connected with furnace.

4 x 20 pipe in the wall should have 10 inch pipe connected with furnace.

4 x 18 pipe in the wall should have 10 inch pipe connected with furnace.

4 x 16 pipe in the wall should have 9 inch pipe connected with furnace.

4 x 14 pipe in the wall should have 8-inch pipe connected with furnace.

4 x 12 pipe in the wall should have 8 inch pipe connected with furnace.

4 x 9 pipe in the wall should have 7-inch pipe connected with furnace.

4 x 7 pipe in the wall should have 6-inch pipe connected with furnace.

Building in the West Indies.

From F. S. R., *Rock Ledge, Fla.*—I went from here some time since in a 9½-ton sharpie to Nassau, and then across and through the Windward Islands to Port Howe. They build much more substantially in that part of the world than they do here. For the most part the buildings are of stone, but occasionally frame buildings are encountered. At one place where we stopped four days they were putting up two wooden houses. I went from one to the other till I got all the information that I thought it wise to ask for. One building was 18 x 30 feet, with porch under the same roof. The frame was all mahogany and "horseflesh"; the latter is a wood that resembles red cedar, but is much stronger. Everything was mortised and tenoned together; even the rafters, the window heads and window sills were mortised in place. The window and door studs were 4 x 5 inches, of mahogany, dressed up to answer for casings. The sidings were of Florida pine, with a bead at the bottom of each piece, put in by hand. The doors were of white pine, with three panels, with a mold struck on the rails and stiles. The windows had white pine shutters made in the same way. The carpenter was making this part the last day I was there. He only had one saw, and that a fine-toothed rip saw. I asked him why he did not use a cut off saw, and, to my astonishment, he told me he had never heard of such a saw. His whole kit comprised an iron square, only marked to ¼ inches, a jack plane, smoothing plane, rip saw, gimlet and scratch awl. The contractor took the job last September for $95, and has not got the ceiling in place yet. He said he stopped sometimes and went fishing. He will hardly make 50 cents a day on the work. Big wages that; but then they have no strikes.

Another Surveying Problem.

From T. H. S.—Since the readers of *Carpentry and Building* seem to be so much interested in problems of the kind proposed by "S. J. P.," I will offer a nut of the same general kind to be cracked. A and B are on the banks of a river, A on the one side and B on the other. A has a steel square and a 10 foot pole; B has two stakes, and one of these he drives into the ground, and after walking up and down the stream a short distance, he drives the other. A agrees not to move out of a space 10 x 10 feet, and yet proposes to tell B how far apart he has driven the stakes; also how far he (A) is from each stake. The question is, how does he do it?

Tool Box.

From G. I. A., *Port Townsend, Wyoming Ter.*—I desire to say a few words about the handy tool box, a description of which appeared in the June number of *Carpentry and Building*. What "Brads" has submitted to the readers of the paper is very good, no doubt, but perhaps some would like to see described what is used in this part of the country. I think our tool box beats his. To construct such an article I take some very light ½-inch lumber. From it I make a box 34 inches long, 10 inches wide and 8 inches high. Then I put a cover in place with a rim 2 inches wide, and put a thin partition the length of box, 2¼ inches from the front side; this space will hold four saws placed reverse ends. I next put a lot of leather loops in the cover for holding bits, chisels, dividers and similar small tools, then in the box proper I have space for my levels, plane, mallet, hammer and hand ax, or most of the tools required on ordinary work. For my square I cut a small slit in the cover. I shove the tongue of the square up through it and then close the cover, letting the blade down to the bottom of the box alongside of the saws. For convenience I cut two hand-holds in the ends of the box, and then put a couple of screw-eyes, one in the lid and one in the box, and put on a small padlock. With this precaution taken I do not lose any of my small tools by mischievous boys, or through other means. A box made in this way is what we call a "shoulder box," and any one who will try the experiment will find that with it he can carry more tools, and that too with less labor, than with any hand-box ever invented; at the same time, the construction of the box is such that the tools are not always getting wet by every little fog or shower that comes up. I have often carried my box of tools, weighing, say, 75 pounds, a mile or more without inconvenience. To carry as many tools as that in a box arranged with a bail will be found quite a task. If any of my brother carpenters will try the shoulder box, I think they will prefer it to all others.

REFERRED TO OUR READERS.

Framing an Octagon Barn.

From R. B G., *Cadiz, Ohio.*—I would like to ask the readers of *Carpentry and Building* for a plan for framing an octagon barn, the angles of which are 25 feet. The barn has a 20-foot story. I would like to see published a diagram of the roof and the cross timbers that support the roof.

Bowling Alley.

From H. H. T., *Watkins.*—Will some of the readers of *Carpentry and Building* furnish plans for a bowling alley, including the length and general dimensions? I want something adapted for a first-class place, the cost not necessarily restricted.

Tuck Pointing.

From E. N., *London City, Canada.*—I notice in many cases that tuck pointing comes off in this vicinity. I do not know what the cause is, and I would be glad to have information on this point. In this connection, I would ask, is it best to rake out and stop with red mortar before tuck pointing—that is, where tuck pointing is to be done on old mortar? Is there any ingredient in the tucking stuff besides marble dust and putty? What are the proportions of marble dust and putty best to be employed? Will salt strengthen or weaken the pointing? I ask this last question in view of winter work, which is sometimes necessary to do.

Blackboards.

From I. N. S., *Halsey, Oregon.*—I should be pleased to have some of the experienced workmen who read *Carpentry and Building* present some methods of constructing blackboards, with suggestions of a finish suitable for the same, in country schoolhouses.

Note.—This subject has been extensively discussed in our columns in the past, but in all probability the question has not been exhausted. Blackboards may be variously made, and perheps further consideration of the topic will be of some interest to a large class of our readers the present year. We therefore refer the question for discussion.

Question in Stair Building.

From C., *Cookport, Pa.*—I desire to submit a question to the practical readers of *Carpentry and Building*. I have a straight flight of stairs to build, and am in doubt as to the proper way to proceed. What I want to know is this: The rise will be 7 inches and the treads 9 inches, and will land on the floor above. How large should the cylinder be, and where should I place the last rise in the cylinder, and can I have the baluster on the landing the same length as the long baluster on the tread? If not, what will be the length?

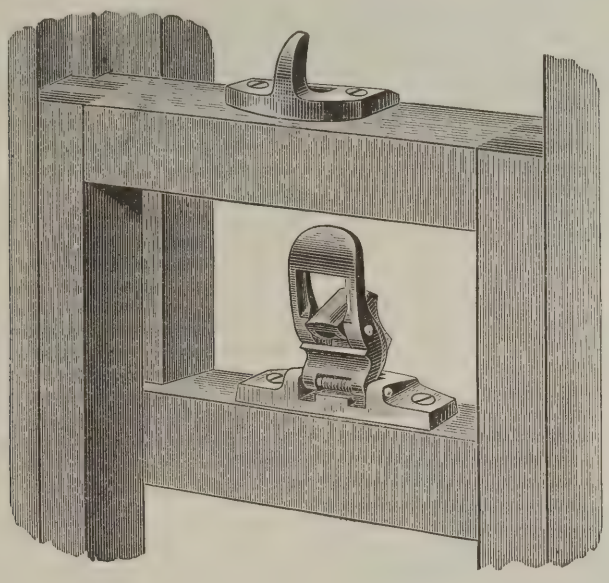
Patent Tri-Square.

From J. C. A., *Bristol, Conn.*—I desire to learn, through *Carpentry and Building*, where I can obtain a very peculiar tri-square. The one that I have seen is stamped as follows: J. S. Halstead, C. J. Ackerman, patented June 26, 1855. The blade is steel, the stock is brass, and a small steel bevel blade is hinged to the stock. There is an opening in the stock, simply for the purpose of lightening it. The article is one that I have never seen but once, and I am desirous of obtaining a duplicate.

NOVELTIES.

Self-Locking Sash Fastener.

In our issue for November last year we presented illustrations with brief description of the Davis automatic sash fastener. In the interval the article has been changed in minor particulars, and is still better adapted for the purpose to which it is devoted. New patterns have been made and it is now upon the market in shape to be of special interest to architects, builders and all concerned in building hardware. The accompanying illustrations, Figs. 1 and 2, represent the article in use, and show it more satisfactorily than on the former occasion. Fig. 1 shows the lower sash partly raised, and indicates the position of the parts when the sash is up. The peculiarity of the device is that as the lower sash descends it trips a lever which causes the locking part to engage with the hook fastened to the top of the lower sash. Accordingly it is impossible to bring the sash down without locking the window securely. The action of two of the parts is simply by gravity, while the lock which engages with the hook on the lower sash is actuated by a spiral spring. This may be locked. To raise the sash, or rather to unfasten the lock, it is only necessary to place the thumb underneath the projecting end of the lock with the forefinger upon the lever or dog immediately behind it. Then, by drawing the forefinger toward the thumb, the parts are released and the lock is raised by the thumb. The lever, in the meantime, which held the lock in place when down, will lock even if the window is not down absolutely tight, or if the top sash is not entirely up. The lock is unpickable, so that it is secure. It is adapted for locking sashes which have a side motion of as much as ½ inch, thus making it useful for old windows.



Novelties.—Fig. 1.—The Davis Self Locking Sash Fastener.—The Lower Sash Partly Raised.

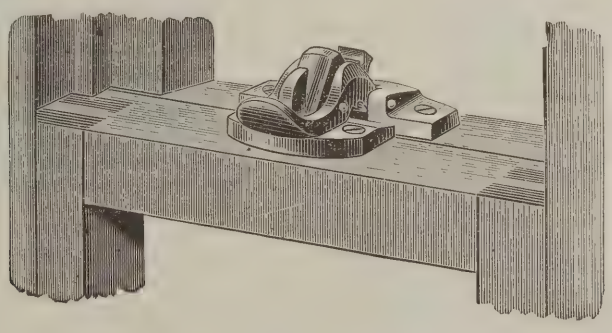


Fig. 2.—The Lower Sash Down, Showing the Fastener Closed.

Double-Jawed Great American Wrench.

The Augusta Wrench Company, Augusta, Me.—soon to remove to Oakland—manufacturers of the Great American wrench, have recently placed on the market a double jawed wrench, the general appearance of which may be seen by reference to Fig. 3 of the illustrations. The article illustrated embodies the same principles as the single form but is made with plain jaws in addition to those specially adapted for grasping bolts and nuts with square heads. The peculiar feature of these wrenches is their method of adjustment, which is accomplished by simply turning the handle. The spindle, which is of steel, has a thread cut on it and runs into the handle the full size, where it is securely fastened. The jaws of the wrench are also of steel, and the handle is fluted, thus enabling a firm grip to be taken.

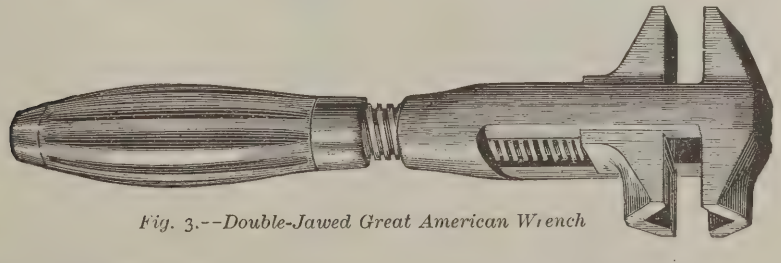


Fig. 3.—Double-Jawed Great American Wrench

article is being manufactured in several different styles of finish, and is neatly and thoroughly made. The shape of the hook on the lower sash is such as to cause the lock to draw the two sashes together, thus preventing the rattling which is common to many windows, notwithstanding the fact that the sash

The Indestructible Drive and Wardrobe Hooks.

We illustrate herewith two styles of the indestructible hooks made by the Perkins & Bradley Mfg. Company, New Haven, Conn.. Fig. 4, shows a drive hook made of heavy wire. The special feature of this hook is the relative position of the points, which enables the wires to pass each other in driving, so that they may be driven separately, when necessary, with the certainty that both points will enter straight. The points are dropped a little from the bend to secure greater holding power, and we are informed that the large hooks will sustain a weight of 200 pounds without starting the points. On the other hand, if it is desired to remove the hooks a slight pressure upward and away from the nail will, it is said, accomplish the result. Fig. 5 illustrates a wardrobe hook made by the same company. The shape of the hook and its general appearance are shown so clearly in the cut that no explanation of these features is necessary. The special point to which the manufacturers direct attention is the screw-holes, which are formed by bending the ends of the wire as indicated. In addition to this, however, the holes are reamed out so as to receive snugly the head of an ordinary screw. Both the drive hooks and the wardrobe hooks are made in a number of differents sizes and in a variety of finishings. Ceiling and hat and coat hooks are also made similar to the wardrobe hooks—that is, with countersunk screw holes.

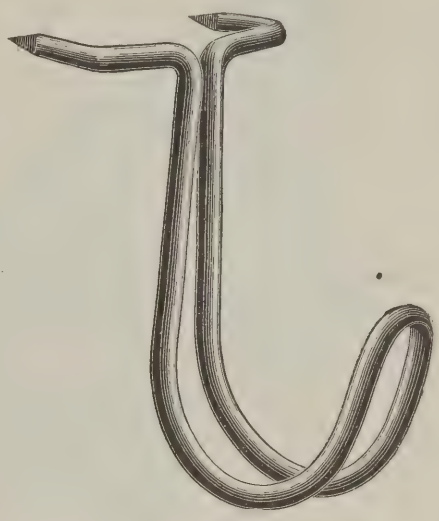


Fig. 4.—The Indestructible Drive Hook.

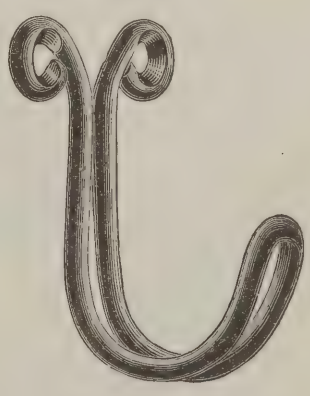
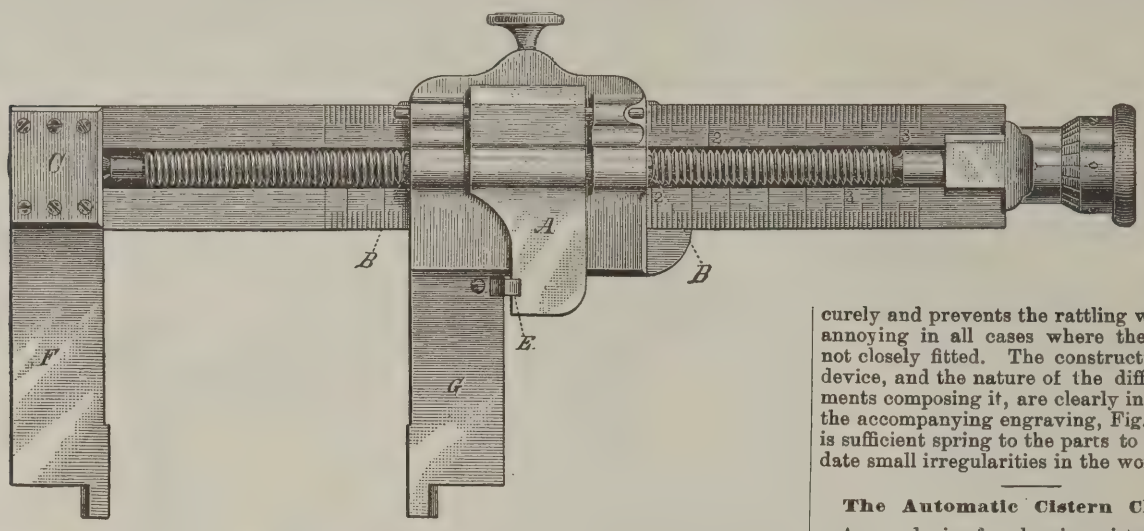


Fig. 5.—The Indestructible Wardrobe Hook.

The Mossberg Micrometer Gauge.

We present in Figs. 6 and 7 engravings of a new form of micrometer gauge, brought out by Mr. Frank Mossberg, of Pawtucket, R. I. The main object of Mr. Mossberg's design was an absolutely accurate gauge, susceptible of varied uses, capable of adjustment at each and every point at which a wear of contacts would destroy accuracy, and which could be turned out at reasonable cost. It will be noticed from Fig. 6, which represents a top view of the gauge, that two graduated scales are employed, one for inside, and the other for outside measurements. The sliding head has a set screw for locking it at any desired point. This screw also co-operates with gibs for the compensation of wear. It may be remarked here that the sliding heads of other gauges have had locking plates provided with half nuts for engaging with and disengaging the heads from the gauge screws. In the gauge which we illustrate a similar locking plate, A, is employed, but it is hinged, and may be adjusted in line with its pivot, and independently of the sliding head on which it is mounted by means of two small adjusting screws, BB. Similar screws are fitted at the end C and in the milled head at the right, affording every means of taking up lost motion. The locking plate A, when engaged with the graduated screw, is held down by a clip, E; this can be easily pushed to one side, releasing it when required. In making a measurement, rough adjustment is, of course, rapidly secured by throwing the plate A out of gear and sliding the head along the shank of the gauge; then pressing the locking plate down, the final adjustment is made by turning the milled and graduated screw head. The pitch of the screw is $\frac{1}{40}$ inch, and the milled head is divided into 25 parts, so that the instrument, it will be seen, measures down to $\frac{1}{1000}$ inch. In Fig. 7 we show an attachment which may be provided for measuring depths. It consists of a rod, H, mounted on the sliding head G, and for guiding it a bearing is provided in the rigid head F, as shown. The outer end of the rod H serves as one contact point, and the outer surface of the fixed head F operates with it, thus enabling the depth of a hole or the location of shoulders to be readily determined by means of either one of the scales. Altogether the device is of ingenious and serviceable design, and will, no doubt, meet with a favorable reception.



Novelties.—Fig. 6.—A New Micrometer Gauge, Made by Frank Mossberg.—Top View.

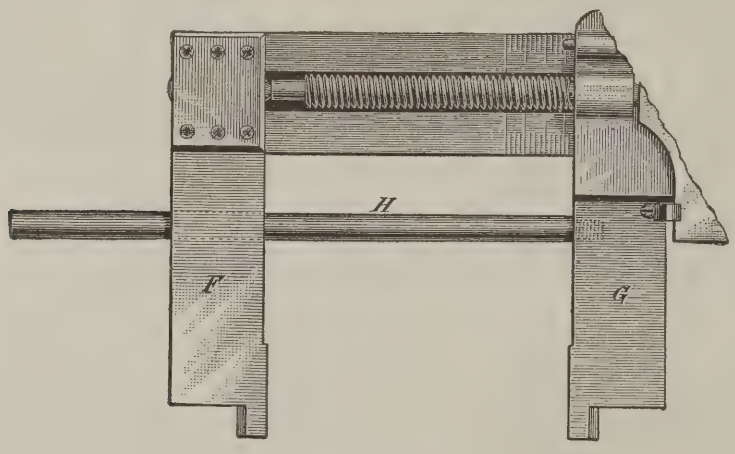


Fig. 7 —Depth Gauge Attachment.

Anti-Rattling Wedge.

Sise, Gibson & Co., No. 100 Chambers street, New York, are putting upon the market a device intended to prevent loose windows from rattling. It consists of a wedge-shaped piece made of metal handsomely plated which is screwed to the sash, and which works in connection with a correspondingly beveled piece that is screwed to the stop. As the window is brought down the wedge action of the parts holds it securely and prevents the rattling which is so annoying in all cases where the parts are not closely fitted. The construction of the device, and the nature of the different elements composing it, are clearly indicated by the accompanying engraving, Fig. 8. There is sufficient spring to the parts to accommodate small irregularities in the work.

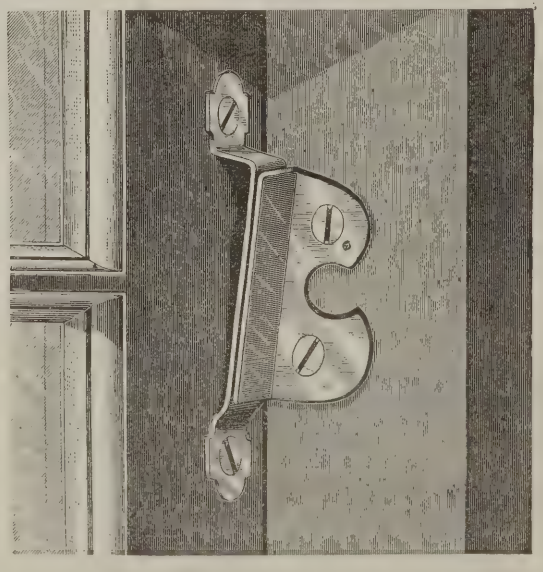


Fig. 8.—Anti-Rattling Wedge for Window Sash.

The Automatic Cistern Cleaner.

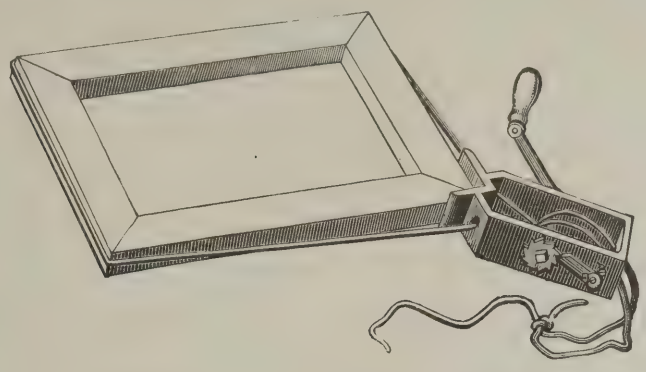
A new device for cleaning cisterns is now being manufactured by the Kibler Manufacturing Company, of Minneapolis, Minn.

Fig. 9.—The Automatic Cistern Cleaner.

An illustration of the cleaner is given in Fig. 9. It is described as about the size of an ordinary bucket, the bottom being made of iron, with a valve in the center opening inwardly. A smaller hole is pierced in the top of the cleaner, sufficiently large, however, to allow the air from the interior of the vessel to escape freely when the cork closing it is withdrawn by the sliding rod connected with it striking the bottom of the cistern. The sliding rod projects below the bottom of the cleaner for this purpose. Immediately upon the opening of the upper hole the valve in the bottom is forced open by the action of the air and mud, pieces of brick, and, in fact, anything not too large to pass through the valve, are sucked in. The cleaner is then drawn up, and the bottom, which is hinged, is unfastened for the purpose of ejecting the contents. A circular published by the company contains testimonials of its efficient working. It is certainly an ingenious device to prevent the waste of water and expense of pumping out a cistern in order to clean it.

Picture-Frame Clamp.

Fig. 10 of the engravings shows an improved clamp applicable to picture frames and other similar work, known in the trade



Novelties.—Fig. 10.—Picture Frame Clamp.

as Fitzgerald's improved picture frame clamp, which is being introduced by William P. Walter Son's, 1233 Market street, Philadelphia. The clamp is intended for use for securely holding work while glueing. Those of our readers who have had experience in matters of this kind know the difficulty attending this work without adequate provisions for conducting it. The clamp is made of iron and has a spindle or shaft running through the frame at right angles, around which the cord is drawn and on the end of which is a crank. The ratchet-wheel on the other end securely holds the tension on the cord. A piece of ordinary sash cord is drawn around the work to be held, the ends of which pass through the holes in front of the frame and in the spindle and out at the back of the clamp. By drawing the cord through the clamp the slack is taken up, and then half a turn on the handle is sufficient to draw the cord firmly and tightly around the work, bringing the strain even on all sides.

Improved Rule for the Perfection Glass Board.

The Lufkin Rule Company, Cleveland, Ohio, with branch office at 134 East Van Buren street, Chicago, Ill., are manufacturing an improved form of rule for their Perfection glass boards, two views of which are shown in the accompanying cuts. Before proceeding to describe the rule we would refer our readers to the description of the Perfection glass board published in our issue of January last, in which issue we also illustrated the rule in the form then made. The board is made in sizes of from 24 x 36 to 48 x 72 inches, and consists of narrow strips of seasoned hardwood, each piece having a longitudinal channel cut in the back to prevent warping. It is ruled from side to side, both ways, dividing the board into even inches. At the top is a series of perpendicular pins, one for each inch, and at the bottom a corresponding series of horizontal pins. The improved rule, Figs. 11 and 12, is provided at each end with a laterally adjustable gauge, connected with and moved simultaneously equal distances by a connecting rod. This device is referred to as an improvement on the old method of moving each gauge independently, as it is impossible with the connecting-rod to move one gauge more than the other. When even inches are to be cut these gauges are brought even with the right-hand side of the rule. The wedge-shaped point is inserted between the perpendicular pins and the plug at the other end of the rule is dropped between the horizontal pins at the desired inch. This holds the rule firmly on the line, allowing for the width of the diamond. If it be desired to obtain a fraction of an inch—say to cut a light of glass 35⅜ inch in length—the point of the rule is first inserted between the pins at the 35th inch. Next, by loosening the set screw shown in Fig. 11 the connecting-rod is released, and then by turning the thumb-nut on its end the rule is moved forward to the proper place by which to cut the glass exactly 35⅜ inches in length.

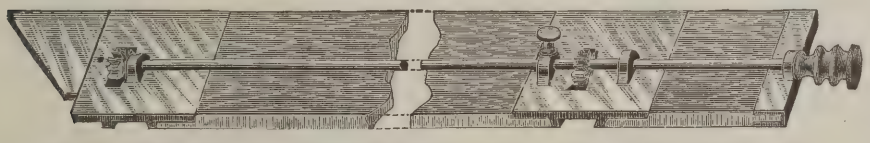


Fig. 11.—Improved Rule for the Perfection Glass Board.—Upper Side of Rule.

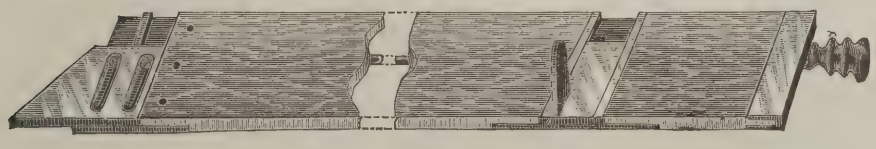


Fig. 12.—Lower Side of Rule.

Self-Setting Bench Plane.

Figs. 13 and 14 represent a new self setting bench plane which is being introduced by the Gage Tool Company, of Vineland, N. J. This tool, the makers claim, combines both the advantages of many of the iron and wood planes already in the market. The construction, as will be gained by an examination of the sectional view, is very simple. In replacing the bit no setting of the same is required, as it enters into the milled groove provided for it, and sets itself with the greatest accuracy. To change the thickness of a shaving it is only necessary to turn the thumbscrew beneath the bit. When properly adjusted it cannot be set wrong or moved out of position by any such means as striking a knot while in motion. This feature is important and will be appreciated by all wood-workers. The cap is not attached to the cutter, but remains stationary, while the bit can be moved up or down by this thumbscrew. Even while in motion the thickness of the shaving can be changed by a simple movement of the thumb and finger. The parts are so arranged that the bit or cutter can be squared with the face of the plane even if the cutter is not ground square with itself. This also is a very important feature. The throat of the plane is preserved from wear by being within the adjustable iron bit holder which extends through the plane and is securely fastened to a round steel rod passing through the stock. The cap and cutter can be removed and so accurately reset in the space of five seconds that the shaving will not vary one five hundredth part of an inch. This statement is made by the makers in order to indicate that the saving of time in setting the bit will amount to an important consideration in a year's use of the article. The makers assure us that in the production of this article they use the best material, and pride themselves on their method of tempering, which secures a uniform quality, and which also enables them to warrant their plane irons to stand the hard-

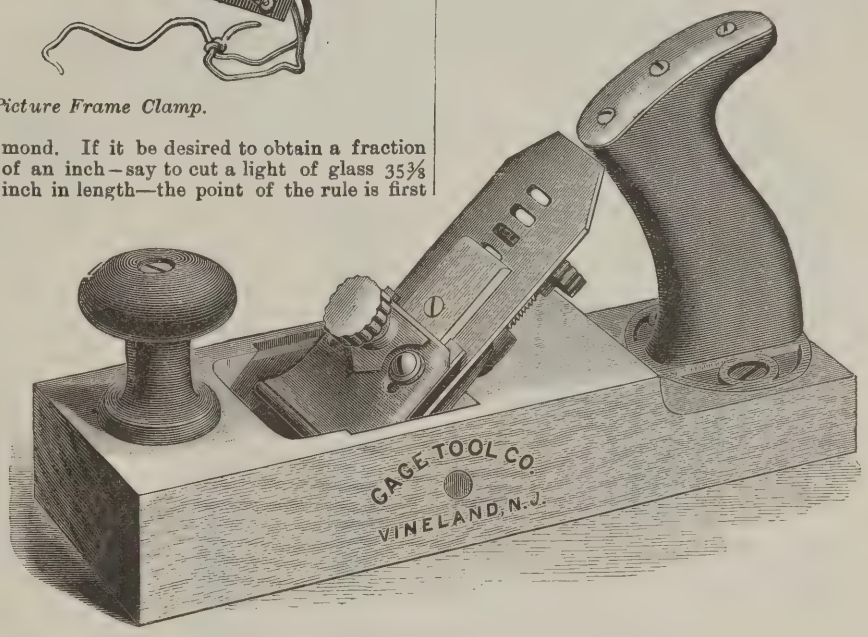


Fig. 13.—General View of New Self-Setting Bench Plane.

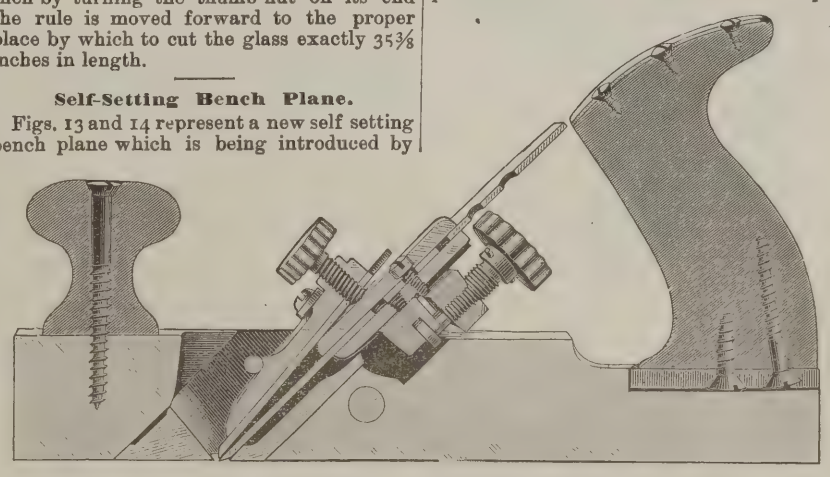
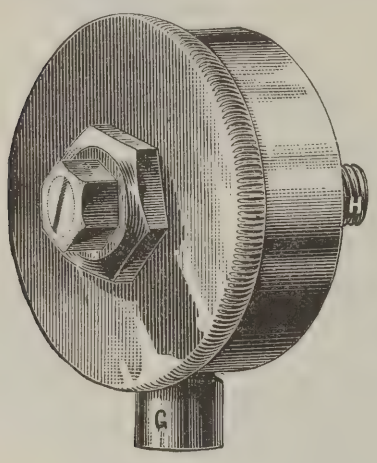


Fig. 14.—Longitudinal Section Through Self-Setting Bench Plane.

est hemlock knot to the satisfaction of the user. The plane can also be changed from single to double and from double to single, as the requirement may be, in a very short space of time. Accordingly the buyer of this article has the advantage of a single iron for rapid work and straight-grained wood, and a double iron for finishing or for coarse grained wood. The wood stock of the tool is soaked with hot wax or oil. The parts are of such a character that they may be adapted for use in an old fashioned wood plane, thus making it possible to have old tools remodeled so as to use these improvements.

Gold's Automatic Air-Valve.

Edward E. Gold & Co., Frankfort and Cliff streets, New York, manufacture Gold's Automatic Air Valve for steam radiators, of



Novelties.—Fig. 15.—*Automatic Air-Valve, Made by E E Gold & Co., New York. —Exterior View of Valve.*

which a general and sectional view are presented in Figs. 15 and 16 of the engravings. The cuts are the full size of the device. Referring to the vertical section of the valve, Fig. 16, A is the brass shell; B, brass disk with Jenkins's seat; C, brass diaphragm, filled with expansive fluid, alcohol or other volatile liquid; D, brass set screw with Jenkins's disk; E, brass lock nut to lock set-screw D when set; F, head of valve; G, outlet to connect drip-pipe; H, inlet to air-valve. The manufacturers particularly allude to

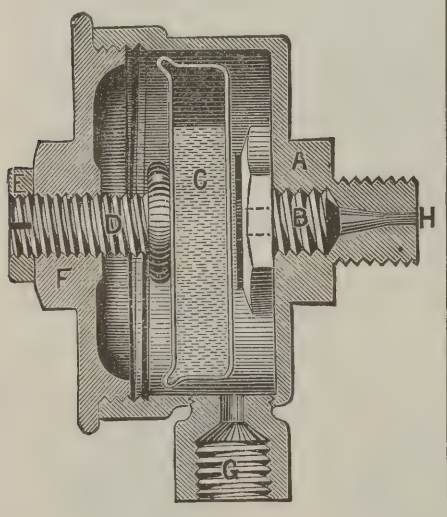


Fig. 16.—*Sectional View of Valve.*

the Jenkins disk and seat which are employed in the valve. The action of the valve is very simple, it being operated by the expansion and contraction of the fluid in the brass drum C, which closes and opens the valve accordingly. The valve is set to close at 212° F., the temperature of steam, and contracts quickly at any lower temperature, thus allowing the air to escape freely, but closing immediately, it is said, when touched by steam. The large flexible seat B is referred to as insuring perfect action, even in case some slight impediment, such as pipe scale or dirt, should get in, which would prevent an ordinary air-valve from seating. The drip pipe is connected at and led away from the outlet G. The head of the valve F, Fig. 16, is easily removed when desired without disconnecting any pipes. By removing this head a new disk can be screwed in and the diaphragm replaced, the only parts, it is said, that ever require renewal, and which, furthermore, are quite inexpensive.

Automatic Elevator Floor Stop and Lock.

Messrs. Yawman & Erbe, 344 North St. Paul street, Rochester, N. Y., are putting on the market an ingenious, and at the same time simple, safety device for passenger and freight elevators. The engravings, which we present, Figs. 17 to 20, will readily explain its arrangement and manner of working. Upon the elevator cable, as shown, are riveted two cone-shaped balls about 3 inches

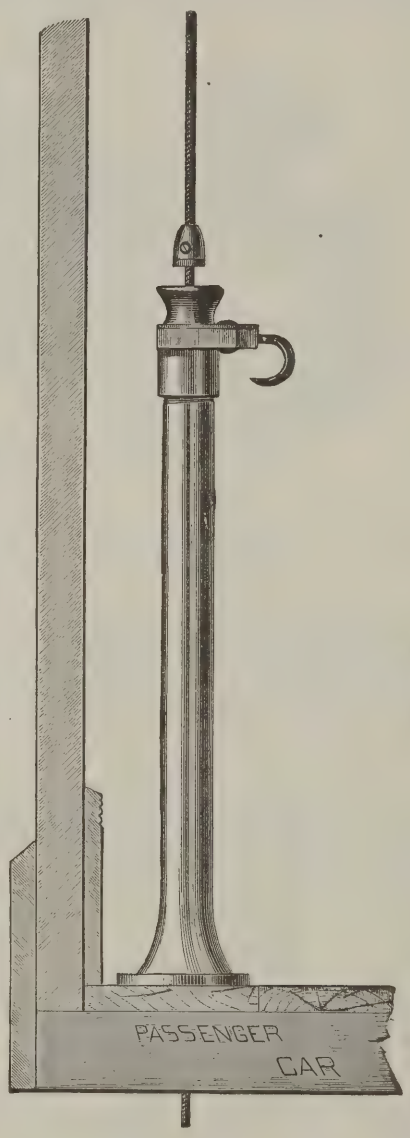


Fig. 17.—*Automatic Elevator Floor Stop and Lock—Passenger Car.*

apart, one pointing upward and the other downward. At the base of these balls are pieces of rubber forming a cushion. Securely fastened to the elevator (and, by the way, these locks can be adjusted to any elevator) is a spring lock so set that the cable, by which the elevator is started or stopped, passes through an elliptical slot. The jaws of this slot can be left open while the elevator passes the first floor, for instance, and then set with the spring, so that at the next floor the first of the stationary conical balls passes through the slot by virtue of its being pointed, but the second ball, which it will be remembered it set with the large end down, will not pass through the slot and cannot slide up the cable. The result is that the elevator stops on an exact level with the floor without a hand being placed to the cable. When the balls on the cable are properly adjusted, the elevator stops exactly where it is wanted. This is a valuable requisite, especially for freight elevators that are to be heavily laden, the elevator car being placed on a perfect level with the floor

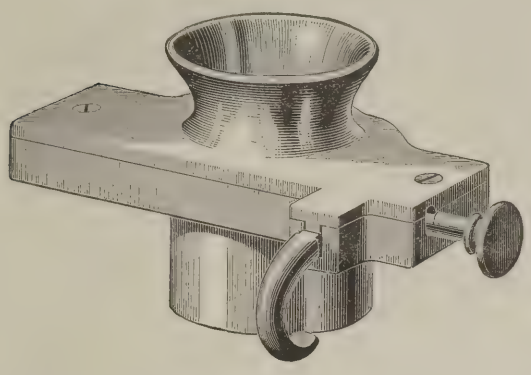
Fig. 18.—*Construction Used on Freight Car.*

without necessitating raising or lowering half a dozen times, so often done by hand. This adjusting by hand is very destructive to belts, and jars the whole machinery used to run an elevator, all of which is avoided by the automatic and exact working of the lock. The precise stopping alone of the elevator, however, is not the only advantage of the device. When once stopped at any floor the elevator is actually locked to that floor, and no person can move it upward or downward without first unlocking it, which is done by the use of an easily working spring. Those who have used elevators will at once readily perceive the importance of this feature of the lock. Accidents not unfrequently occur where an employee leaves the elevator to go, perhaps no more than ten feet, returns and steps upon what he supposes to be the elevator, but which is often only air, because some one else is using the car. The lock prevents all such accidents. In the case of hydraulic elevators, if the valve leaks, the elevator will creep upward, and if the cylinder leaks it will gradually go downward. If the car is locked to the cable, and it should commence to creep, the lock moves the shifting cable and lets in or off more water, so that the car regains its level with the floor. The device, we understand, is in extensive use and has thus far given highly satisfactory results.

Doors, Sashes and Blinds.

Some pleasant gossip occasionally characterizes the columns of our sprightly contemporary, the *Timberman* on, subjects of general interest to builders. In a recent issue doors, sashes and blinds formed the special subject treated in this manner. Some quotations from the article in question will, no doubt, be of interest:

"Talk about doors," said the orator, "D. O. Mills, the New York City millionaire is having a $7000 bronze door made for the tomb he is building at Tarrytown, N. Y. It will be 8 feet 6, by 4 feet 6. The style is in imitation of the old-fashioned oak doors, with a lattice-work top. The paneling, cross-pieces and wood grooves are to be repeated in bronze. Three companion pieces are to be made as windows. They are 3 x 4 feet and in bronze lattice-work."



Novelties.—Fig. 19.—Exterior of Gripping Device.

"I am informed of another innovation," said the wholesale door dealer. "Paper window glass is now said to be an assured fact. A window pane is made of white paper, manufactured from cotton or linen, and modified by chemical action. Afterward the paper is dipped in a preparation of camphor and alcohol, which makes it like parchment. From this point it can be molded and cut into remarkably tough sheets, entirely transparent, and it can be dyed with almost the whole of the aniline colors, the result being a transparent sheet, showing far more vivid hues than the best glass exhibits."

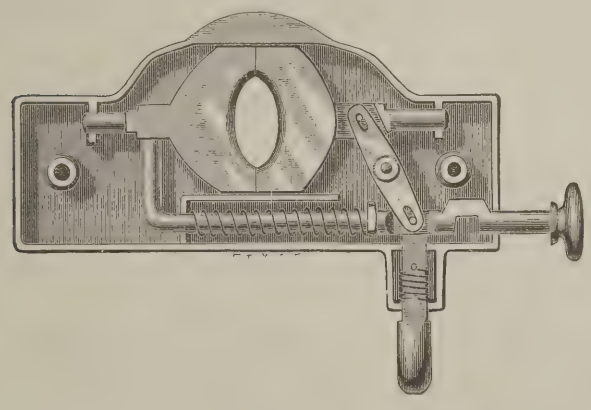


Fig. 20.—Horizontal Section Through Gripping Device.

"One of the greatest nuisances we have to contend with," said the Twenty-second street door dealer, "is the great variety of styles of glass for use in doors, windows, &c., that is now being put upon the market. Why, there is no end to the kinds of glass—enameled glass, chipped glass, calico glass stained glass, and every kind that you can imagine is being imposed on us by ambitious glass makers, and, do you know, the tricks they play to compel us to handle them are perfectly outrageous. They actually send samples broadcast to consumers in order to stimulate a demand for their odd creations."

"Boston for beans, New York for stocks, Chicago for lumber, Oshkosh for doors," said the orator, "and there are a great many people in this universe that have no comprehension of the magnitude of the door business in our growing city. I'll tell you; there are six large factories engaged in the business, all thoroughly equipped with the best mechanical appliances, and the average daily product of four of these factories is 300 each, or 1200 doors; one can make 500 doors a day, while the largest has a capacity of 750 doors; and as all are working well up to their capacity at this time, the output is at the rate of 35,000 doors for a year of 300 working days. The doors will average close to 6 feet 8 inches in length, and 2 feet 8 inches in width, and each door contains about 35 feet of lumber, which costs within a fraction of $22 a thousand feet—the average price of stock common and better.

"But, mind you, the machinery is not all at work making doors," said the orator, as he put a new point on his pencil. "These same concerns are producing windows at the rate of 1,500,000 annually. The open windows sell at about 35 cents and the glazed at 70 cents, and run about half and half in the course of the year's business.

"And blinds, come to think of it, notwithstanding the hue and cry against outside blinds, the people will have them. Why, the work of slatting, pinning and finishing blinds in these same factories is enormous—close to 420,000 pair of blinds are produced annually in Oshkosh, and these are worth about 75 cents per pair."

Macadamized Roads.

We venture to say that comparatively few of our readers who have heard the term macadamized roads or who have ridden over roads of the general kind made by the famous Macadam, the road-maker, are aware that the name by which such roads are commonly designated was derived from his name. Recently we have encountered a specification by Macadam, being a form used by that engineer. We present it herewith, thinking that it may be useful as a precedent, to say nothing of its being a curiosity.

The road to be formed and made according to the plans, sections and cross-sections which accompany this specification.

(or)

The roadway is to be formed and made as the ground is presently marked out by pegs, level pegs and trig line.

The contractor to do all the excavations, fillings, embankments, turf banks, walls, culverts and drains as shall be pointed out and described in the margin hereof, in such a manner as to leave the roadway of one uniform width, and properly balanced, so that one water-table may be of the same horizontal level as that opposite to it (unless otherways directed). That the roadway when formed shall have one uniform convexity, rising—inches from the water-table to the center.

That the turf, mold or natural surface of the ground is not to be disturbed excepting where it is necessary for the proper formation of the roadway, as above described, and then not more than is necessary.

The surface of the roadway is to be made true by the removal of all uneven parts, large stones or points of rock, and rake smooth previously to any material being put upon it.

That all material for making the road be prepared and brokon before it is brought to the road. That no material is to be broken on the road, either in the first or last coatings.

That the road is to be formed of a uniform thickness of material to the aggregate depth of 10 inches of stone, to be procured from such quarries or other places as are mentioned in the margin hereof, to be broken to a uniform weight of 6 ounces, and, when carted to the roadway, to be lifted and spread out of the shovel by scattering.

That a second coating of stone is to be procured as directed in margin, and to be laid on 2 inches in thickness, previously broken to the weight of 3 and 4 ounces, to be brought to the road when the previous 6 inch coating is partially settled, and then spread as before directed by scattering from the shovel. On no account are the heaps to be "pushed abroad." All is to be relifted by the shovel—this even if the stone is wheeled on.

When this second coating is three parts settled, the surface is again to be covered with 2 inches of gravel or smashed stone, to be procured as directed in the margin, and reduced to the size of horse-beans.

This coating of stone or gravel to be carefully scattered on in two or more layers, and not all at once.

Each coating of material to extend from watercourse to watercourse, and to be of uniform thickness, following the convexity of the roadway given in the first instance.

A sufficient number of men with heavy stone rakes to be constantly employed from the first coating of material, to rake in and obliterate all horse and wheel marks as soon as they are made, and to gather in the displaced material so as to preserve the uniformity of thickness, until the whole has settled and become firm, smooth and hard.

If this work is done in very dry weather, it should be watered to cause the stone to settle before the angles of the stone are worn off.

The contractor to find all tools, carts, horses, wheelbarrows, planks, posts, rails, scaffolding and materials of all kinds necessary for properly carrying out the work.

Figures or plans and sections to be taken in preference to dimensions, as shown in the drawings.

If the work is done by plans and sections the contractor is to set out his own work, subject to revisal.

If without plans or sections the work to be set out and level pegs driven for the contractor.

The whole work to be completed in —— weeks, from —— and to the satisfaction of ——

The contractor to be held liable for all damages arising from his own acts, or the acts of his people, in the execution of the work, especially such as may arise in consequence of the proper execution of the work as ordered, and unforeseen.

The contractor to pay for all materials and for the damage done in procuring them.

The contractor to be allowed any advantage which may exist in any acts of Parliament, orders of boards, &c., which may exist affecting the works in operation.

The contractor to be paid by —— installments as the work proceeds, on the certificate of ——, and the balance to be paid to him within —— months after completion of the contract, on a similar certificate.

Disputes to be settled by umpires, who may call in a third or fifth man, as the case may be.

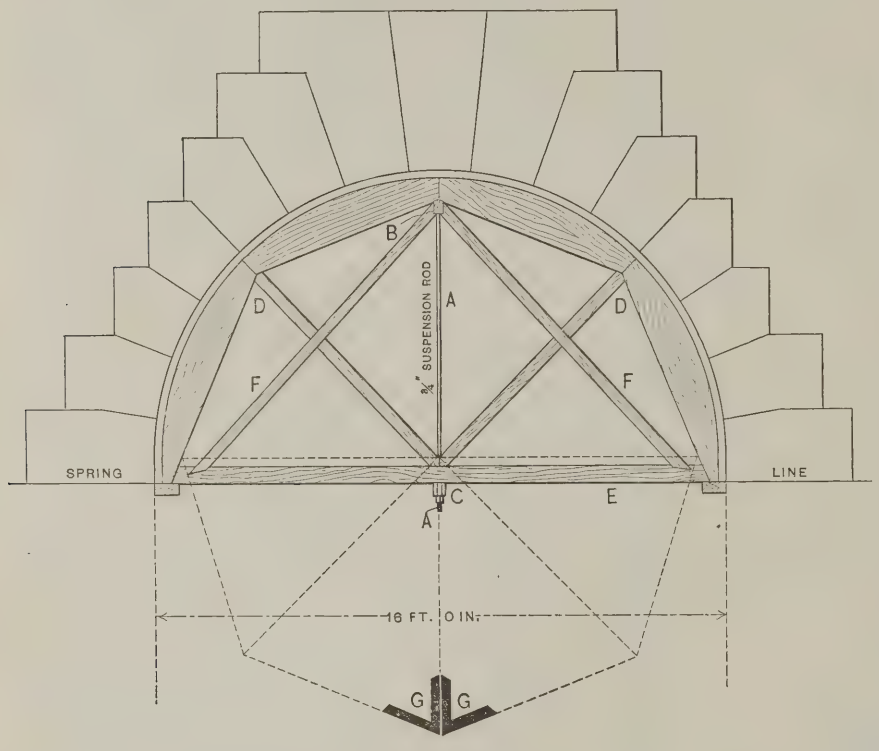
Theater Fires.—According to *Fire and Water*, Dr. Choquet, in a work recently published in Paris, gives the following figures as to the theaters burned since 1750 in periods of 10 years: From 1750 to 1760, 4 theaters burned; 1760 to 1770, 8; 1770 to 1780, 11; 1780 to 1790, 13; 1790 to 1800, 15; 1880 to 1810, 17; 1810 to 1820, 10; 1820 to 1830, 32; 1830 to 1840, 30; 1840 to 1850, 54; 1850 to 1860, 76; 1860 to 1870, 103; 1870 to 1880, 169; 1880 to 1885, 174. The writer follows up these statistics by giving the number of victims. From 1750 to 1760, 10; 1760 to 1770, 4; 1770 to 1780, 15; 1780 to 1790, 21; 1790 to 1800, 1010; 1800 to 1810, 37; 1810 to 1820, 85; 1820 to 1830, 105; 1830 to 1840, 813; 1840 to 1850, 2144; 1850 to 1860, 241; 1860 to 1870, 104; 1870 to 1880, 1217; 1880 to 1885, 628; total, 6573, or an average of 48 per annum. The most calamitous of these disasters were those at Capo d'Istria, in 1794, when 1000 persons were killed; St. Petersburg, in 1836, which

resulted in the loss of 800 lives, Canton, in 1845, which had 1670 victims; Brooklyn, 1876, with 283; Shanghai, in 1871, 120; Tientsin, in 1872, 600; and lastly the Ring Theater, Vienna, which had 450 victims.

Practical Centering.*

BY OWEN B. MAGINNIS.

Continuing the general subject of "Centering," several illustrations of which are presented herewith, I would first direct attention to Fig. 1, which shows very plainly the necessity of using great care and accuracy in setting centers in order to carry stone work. Here the voussoirs are cut to correspond with the running courses of ashlar and are bound into the wall, thereby insuring great stability. The arch, 16 feet in diameter, is sustained by a framed center constructed on the Howe principle, the whole construction being placed in tension and tightened by the iron bolt. The bolt A is headed at the top and passes through the transverse piece B, the foot of the brace and tie piece C bringing



Practical Centering.—Fig. 1.—Large Center in Ashlar Work.

the weight on the bearer joints D D, entirely on the center of the longitudinal tie piece E'. This is suspended on A passing through B. B is supported by the braces F F, which rest on the tie-piece E. The weight, being carried on

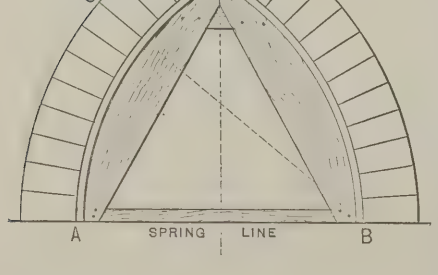


Fig. 2.—Equilateral Arch.

the uprights, rests solidly on the stone sill below. On the lower side of the tie-piece is shown how the bearer joints are all similar, the inside figure being an octagon and the bevels G G being set to the same angle. The curve of the center is carried below the center line or diameter. This is done for architectural effect; hence, the spring line must be indicated and the bearers must be laid

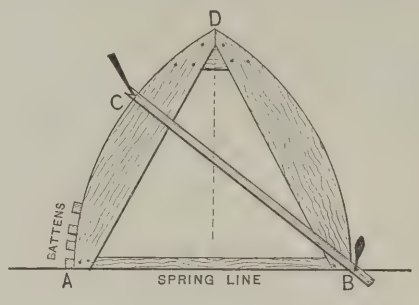


Fig. 3.—Laying out the Bearers for a Gothic Arch.

out from it; all lines below must be drawn parallel to it. The timber used in the construction of centers of large diameter must be sound in character and of large dimensions. The tie piece in this case is 2 x 8 inches, braced with 2 x 8 inch, halved together in crossing, and joggled into the tie-piece. The braces should not be less than 1½ inches thick, and should be as wide as possible. The bearers should be 2 inches thick; the transvers piece B should be 3 x 6 inches; the wrought- iron rod should be 1 inch in diameter. Since the stones weigh a considerable amount, the center

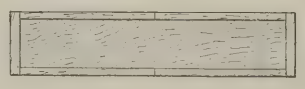


Fig. 4.—Plan of Center.

must be strong enough to support them without risk. This design of arch, which has a leaning to the Arabesque or horseshoe pattern, is greater than a semicircle, and was used in a large building in Brooklyn a short time since. In this case the center was carried on the projecting imposts of the capitals.

The centers of Gothic arches are many and varied in form; but they are easily struck, however, from the central point or radii shown by architects in their detail drawings. The simplest to strike out is the equilateral arch center, shown in Fig. 2. The centers for striking the curves are plainly indicated. The head or rise of the arch is equal to the span or width. From this it will be seen that straight lines joining the apex with the base will form an equilateral triangle. The centers for striking out the curves for bearers therefore will be on the base or spring line, as A and B. B C in Fig. 3 is a rod striking the left curve. From A to the apex D all stone or brick joints run in the direction of C B. Fig. 4 is a plan of the center without the apex ties, showing the edges of the bearers and lower tie-pieces.

The obtuse point or drop arch illustrated in Fig. 5 is constructed from centers on the base line. The radius is less than the span. It will be easily understood from the preceding description. All braces, however,

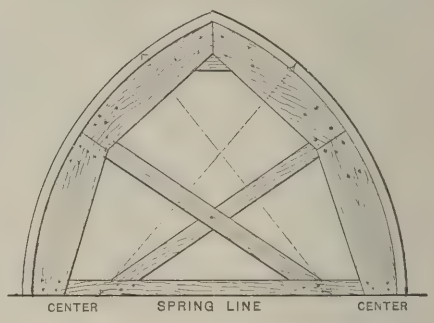


Fig. 5.—Center for a Drop Arch.

must, as is shown, run in the direction of the centers, from which the curves are struck. This arch is supposed to be 6 feet in span. Fig. 6 illustrates another arch of the same character, the radii of which run to centers far below the spring line, being on the jamb line and drawn square to the spring line. The Lancet Gothic arch, Fig. 7, has striking centers, which are likewise on the spring line, but differs from those described last in the radius being longer than the width of the span. The lines join in a way to form an isosceles triangle, the hight of which is greater than the width. For large centers, calling for long bearers, the method followed in the sketch is the best, having, if such is needed, the extra brace shown by the dotted lines. This should be inserted and nailed to the joint tie-piece. Small center bearers, of course, can be cut out of one piece of board, as already described. Joints, lines and braces must run on radial lines.

Tudor arches vary much in shape, and are all struck from centers within the arch. The arch represented at Fig. 8 is struck from four centers, two of which are on the spring line,

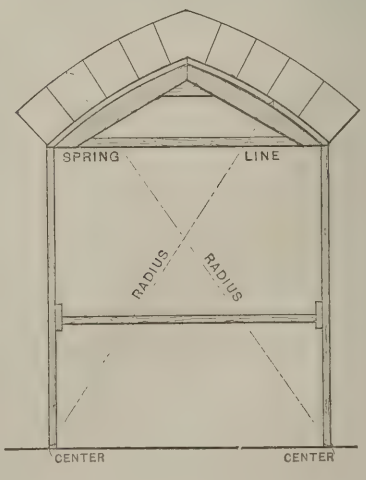


Fig. 6.—Another Form of Drop Arch.

and formed by dividing the spring line into four equal parts, the two outside divisions indicating the radii required for the lower curves. The centers for the upper curves are found by taking the whole width of the span as radius and cutting the line of the jamb with this radius, as shown in Fig. 8.

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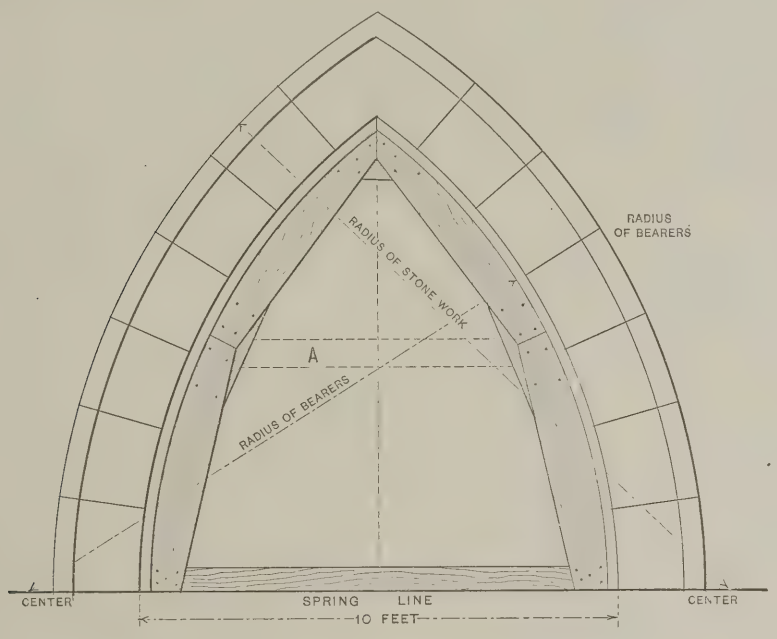
The intersection will be the center desired, and the radius will be to the tangential point of the small curve. However, as centers are usually given by the architects to strike out all arches, the above will be sufficient to aid the beginner when he meets this arch. It will be noticed that as the joint of the curve bearers is above the tangential point, so all braces must run to the centers for the upper curves. Fig. 9 is a three-center arch, showing one bearer, the striking out points and radii.

Mediæval Wood Carving.

One class of literature, frequently accompanied with pictorial illustrations in the manuscripts, says T. Wright, comprises the calendars or ecclesiastical almanacs, in which the domestic or agricultural employments of each month are pictured at the top or in the margin of the page. Such subjects are extremely frequent in the carved stalls. Three stalls in the cathedral of Worcester represent men employed in mowing, reaping and sheaving the corn. Another represents the swineherd feeding his pigs by beating down the acorns from the trees. This last is a very common subject. Scenes of hunting or hawking are also frequently met with. The stall carver has given a still wider range to his imagination in representing domestic scenes, which are very frequent and very interesting for the light they throw on the popular manners of our forefathers in far distant times. A very curious example may be cited from the cathedral of Worcester, which represents a domestic winter scene. A man closely wrapped up is seated beside a fire stirring his pot; his gloves, which are remarkable for being two-fingered, as well as the expression of his features, show that he is suffering severely from the temperature. He has taken off his boots, and warms his feet by a rather close approximation to the fire. All the details of the picture are equally curious—even to the side ornaments, one of which represents two flitches of bacon, the winter's provision, suspended to a hook, while on the other a rather gigantic cat is basking in the warmth of the chimney. On a stall from Minster Church, in the Isle of Thanet, an old woman, a witchlike figure, is occupied at her distaff, accompanied by two cats of grotesque appearance. One of the stalls at Great Malvern represents a man at his dinner. Another in the same church exhibits a woman in bed, attended by a physician. Others of this class are more grotesque and playful, representing games and pastimes and practical jokes, not always restrained within the bounds of the delicacy of modern times. Monks and nuns sometimes appear in scenes of this description, of which some curious examples are furnished by the stalls in Hereford Cathedral. It is remarkable, and especially characteristic of the carvings, that scriptural or religious subjects are very rare. An example of a saint's legend occurs in the representation of the story of St. George and the Dragon on a stall at Stratford-upon-Avon, the side ornaments to which are not very congruous grotesques. The stories of the great Mediæval romances also find a place in these representations. A foreign example represents the fabulous Aristotle subdued by the charms of his patron's wife—the subject of a well-known poem—the lai d'Aristote. A stall at Glouarm, and riding on a goat, in the stalls of Worcester Cathedral, may be considered as belonging to this class. A figure of a fool riding on a goat occurs on the stalls at Gloucester. The subjects most commonly supposed to be of this allegorical character are mere grotesques, copied from those fantastic sketches so often found in the margins of manuscripts of the thirteenth, fourteenth and fifteenth centuries.



Practical Centering.—Fig. 7.—Lancet Gothic Arch.

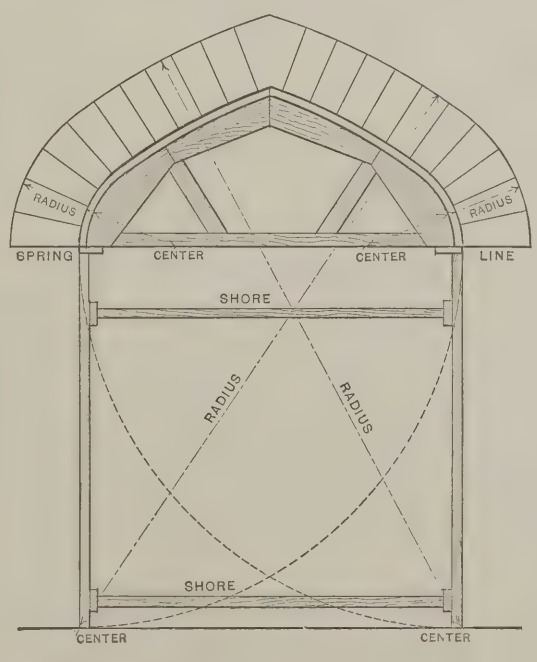


Fig. 8.—Centers for a Four-Center Arch.

TRADE NOTES.

The Stanley Rule and Level Company, with office at 29 Chambers street, New York, inform us in a recent letter relating to some of their special tools that the clapboard marker which they are offering is juts what carpenters have been waiting for. They assert further that any workman can save the price of it in three days by the increased facility with which he can work, to say nothing of the better work that will be accomplished. They inform us that they have sold nearly 4000 since January, or, correcting this statement, they say these tools have sold themselves. While dealers in some cases have been slow to take them up, the carpenters have reached for them. This tool, as many of our readers already know, is entirely new in principle, and is not simply an improvement on some former article intended for the same purpose. We notice, by recent circulars issued by the company, that, deferring to the confusion that seems to exist in such terms as clapboard siding, weather boarding, &c., among the trade, they have called the article both clapboard and siding marker.

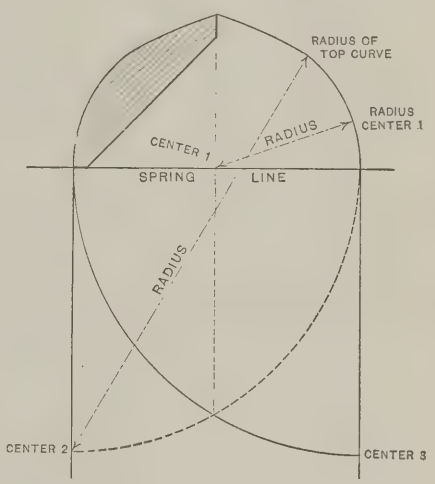


Fig. 9.—Diagram of a Three-Center Arch.

William Gardiner & Co., Portland, Ore., have been added to the list of selling agents for the Gurney Hot-Water Heating Company. The headquarters of the company is No. 237 Franklin street, Boston, Mass.

The asbestos roofing manufactured by the H. W. Johns Mfg. Company, 84 Maiden Lane, New York, and with branch offices in Chicago, Philadelphia, and London, England, has long been before the public, and has met with such success that many of our readers are familiar with its merits. It is a portable roofing, and at present is in position upon roofs of numerous factories, foundries, chemical works, railroad bridges, cars, &c., in different parts of the world. The rolls in which it is put up for shipment contain 200 square feet, and the roof, including the asbestos roof-coating with which it is finished, weighs about 85 pounds to the square. The makers claim that it is adapted for all climates and is of a character to be readily applied by unskilled workmen.

We have received from H. Maack, No. 3066 South Ninth street, St. Louis, Mo., the prospectus of his Academy of Architecture, for the coming season. The institute is intended to meet the wants of the building trades, by directing young men belonging to

trades in the cultivation of their minds, and by making them susceptible of higher mental culture, thereby imparting an amount of knowledge and skill which will enable them to meet the requirements of life in general, and to follow the progress of mechanic arts with intelligence. The prospectus contains the course of study and other particulars which are of interest to all who are contemplating a course of this kind. The school, we understand, has been in successful operation for some time past.

BERRY BROS., of Detroit, Mich., are sending out a circular inclosing some samples of different kinds of wood treated with their hard-oil finish, in which they direct attention to the fact that the trade at the present time is being inflicted with spurious samples of their goods. It appears that a rival manufacturer has been distributing pieces of wood finished in an inferior manner and representing that the same were done with Berry's hard oil finish. The object of the circular before us is to brand the representation as false. Those who have used Berry's hard finish, and those who know its reputation and the reputation of the firm, are not likely to be made victims of any such attempted imposition.

WE ARE INFORMED that the Peerless Mfg. Company, of Louisville, Ky., have recently closed a contract for 275 English grates for the new hotel now being erected at San Diego, Cal. The company's business is reported to be in excellent condition, with numerous orders from all over the country, including several important contracts in Louisville.

L. H. OLMSTED, in another part of this issue, directs attention to the new form of his miter box, which he is now putting upon the market. Its distinguishing feature is the employment of double irons for the square cut-off. He is also introducing a form of box in which an iron frame is substituted for the wooden sides. The most careful workmanship, as well as judicious selection of material, characterizes the goods of this maker.

WE ARE IN RECEIPT of some very handsome photographs of the interior galvanized-iron work for the new courthouse at Columbus, Ohio, which are forwarded by the builders of the work, W. R. Kinnear & Co., of Columbus. The work is among the finest specimens of interior sheet-metal work that has been our opportunity to examine for a long time. The building has six ceilings in all, finished in sheet metal, and since the work has been in place it has been frescoed, the surface ornamentation happily complementing the molded and foliated surfaces of the sheet metal.

WE MENTIONED some time since that J. E. Bolles & Co., of Detroit, Mich., were contemplating a removal to new works. They have recently made the change, the new establishment being located on Woodbridge street, between Seventh and Eighth streets. In the new establishment they have more than four times their former capacity. The new works consist of a new three-story brick building, 60 x 100 feet, with a large erecting shop in the rear, 70 x 120 feet. Shipping is facilitated by a side track from the Michigan Central Railroad. We understand that the firm are very busy at the present time. Among prominent orders may be mentioned a quantity of ironwork for Sault Ste Marie, a jail at Howell, Mich., and a police station in Detroit. They are also preparing a large quantity of ironwork for a new passenger station, at Houston, Tex.

J. B. SHANNON & SONS, 1020 Market street, Philadelphia, invite the trade to send for their illustrated catalogue of more than 200 designs of building hardware, which they offer to mail on receipt of postage.

WE HAVE RECEIVED from the Egan Company, Cincinnati, Ohio, a poster containing cuts of a large number of machines which they manufacture. The cuts are of smaller size than the usual catalogue engravings, with which many of our readers are acquainted, but are sufficient to give the would-be buyer a good idea of the design and construction of each of the devices. To the lay member of the community it is surprising how many different forms of wood-working tools are in use and how many different machines one establishment produces. Among the printed matter contained on the poster is the advice to the reader that the sheet shows only a small portion of the machines built by the Egan Company, and, if there is not found exactly what is wanted, they will be glad to have the want explained, so that they may send their complete catalogue.

THE DAY MFG. COMPANY, of Detroit, Mich., are directing attention to the self-heating bath tub which they manufacture, and which is heated by gas, gasoline or kerosene. They invite the trade to send for circulars.

AS THE COLD WEATHER comes on the question of heating dwellings becomes of prime importance. J. C. Henderson & Co., 196 River street, Troy, N. Y., in directing attention to their specialties, present this month a sectional view of Henderson's tubular dome furnace. The excellent reputation of the goods of this company is well known to many of our readers.

THE NEW YORK LUMBER AND WOOD WORKING COMPANY, with general office at No. 173 Broadway, and factories on 134th street, near Alexander avenue, New York City, and Batavia, N. Y., direct attention in this number to the general lines of goods which they manufacture. These include general house trimming, stair-builders' supplies, sash, doors and blinds, flooring and lathing, shingles and lumber of every description.

THE COMMITTEE ON BUILDINGS of the Centennial Exposition to be held in Cincinnati next year have advertised for bids for the erection of the buildings necessary for the purpose. These are to be erected in Washington Park, Cincinnati, and are to be used in connection with Music Hall and the other buildings long used for exposition purposes in that city. The estimated cost of the additional buildings is in the neighborhood of $100,000.

THE CINCINNATI CORRUGATING COMPANY present in their advertisement in another part of this issue a specimen of corrugated roofing, and another of standing seam roof. The trade is invited to send for their illustrated price list.

WE HAVE RECEIVED from the H. B. Smith Company, 137 Centre street, New York, an illustrated and descriptive catalogue of Gold's improved patent low-pressure heating and ventilating apparatus, which they erect. In the introduction to the present edition to their catalogue they call attention to the fact that they have been engaged in the manufacture and erection of this apparatus for more than a quarter of a century, and refer to the liberal patronage they have received as evidence of its value. In the first few pages of the pamphlet are presented perspective and sectional views of Gold's boiler, together with a full descriptive text of the same. A double-page illustration is also given of an inclosed view of a dwelling, showing their improved method of heating and ventilation. The cut possesses a number of features of interest, and shows the combined systems of hot air, direct and indirect radiation. The last six pages of the pamphlet are closely printed with the names of those who have used the Gold apparatus and can testify to its advantages. The pamphlet is neatly printed in colored ink, and is gotten up in a serviceable manner.

L. F. PARKS, 272 Colrain avenue, Cincinnati, Ohio, is directing attention to his foot-power mortising and tenoning machines, also to special tools for use in machines of this kind. He invites the trade to send for circulars.

IN ANOTHER PART of this issue Heaps Patent Earth Closet Company, Muskegon, Mich., direct attention to the patent dry closet which they manufacture, and of which over 23,000 are now said to be in use. They also call attention to the illustrated catalogue which they are prepared to supply.

WE ARE INFORMED that E. Van Noorden & Co., of Boston, have recently furnished the roofing and skylights for the Cumberland Mills, Maine, and for the new Opera House, at Brockton, Mass. Among other buildings upon which they are at present engaged, and which will use specialties in their line, may be mentioned the United States Naval Station, near Rockland, Me., the Boston Insurance Building, at Yarmouth, and Daggett's Block, Haverhill, Mass.

A NEW CATALOGUE of William B. Dunning's Base-Burning Magazine Boilers, manufactured by the New York Central Iron Works, at Geneva, N. Y., has just been received. A number of new and late improvements are presented, among which may be mentioned a portable boiler to be set without brickwork and an improved form of direct draft. The catalogue is neatly printed and is very thoroughly illustrated.

THE HARTFORD SANITARY PLUMBING COMPANY, Hartford, Conn., have brought out a water-closet for which a number of advantages are claimed. The whole exposed interior of the closet, bowl, stand-pipe, float and tank are made of opaque glass of the best quality, and metallic casing is provided for every part. This closet is the result of numerous experiments, and the company, it is stated, are now ready to place them in manufactories, public and private buildings, &c.

J. F. WAGNER, with office at 252 Broadway, near Murray street, New York, is the authorized Eastern agent of Bakewell & Mullins, of Salem, Ohio. We understand that Mr. Wagner has fitted up his office with samples of the zinc ornaments produced by this establishment, and is at all times ready to respond to the calls of the trade for goods in this line.

CONSIDERABLE ATTENTION is being given at the present time to the subject of estimating, to the adoption of uniform methods upon the part of contractors, and to uniformity in architects' specifications. The president of the National Association of Builders has appointed Mr. E. E. Scribner, of St. Paul, Minn., well known to the readers of this journal as one of the leading cornice men and roofers of the country, and who is also president of the Contractors' and Builders' Board of Trade of St. Paul, to be the head of the committee to confer with the Western Association of Architects, at Chicago, in October, for the purpose of formulating a plan for securing uniformity in contracts and specifications. Mr. Scribner is ably assisted in this work by Messrs. G. C. Prussing and P. B. Wright, of Chicago

MESKER & BRO., of 421 South Sixth street, St. Louis, Mo., send us a circular, done in colors, illustrating their new panelled sheet iron ceiling, which they are largely manufacturing at the present time. The construction is such as to admit of the ceiling being put into place in an economical manner, and the architectural effect is excellent.

JAMES B. SCOTT & CO., of Pittsburgh, are sending out a dainty as well as useful advertising souvenir in connection with their Scott's Extra Coated Roofing Plates. It consists of four most excellent drawing pencils in a handsome polished wood box. The pencils and box were made to their order by the Joseph Dixon Crucible Company, of Jersey City, N. J. In addition to the usual legends contained upon such pencils there is stamped upon each in gilt letters, "Scott's Extra Coated Roofing Plates."

KNISELY & MILLER, Chicago, who some time since commenced the manufacture of corrugated conductor-pipe, and who have had various sizes of round pipe in the market for some time past, inform us that they are now making, in addition to the assortment of round pipes, a 4-inch square pipe, and that they will be ready with 5-inch square pipe in a very short time. The square sizes will have the same desirable features about them as the round pipe, which has met with such favor with the trade at large. The lengths are 8 feet without any cross seams and are very perfect in character

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE Superintendent of Public Instruction of the State of New York has issued a circular with reference to plans and specifications for schoolhouses. The circular invites plans and designs for the erection of low-priced school buildings. It is based upon an act of the Legislature passed June 24, 1887, and which appropriated the sum of $25,000 for carrying out the purpose of the act. The circular is in the form of an invitation to a competition. Six classes of buildings are specified, ranging from $600 to $10,000. The drawings required are, plan of each story, two elevations, one section and one or more perspectives at the option of the author. The prizes on the first five classes are two in amount for each —namely, $100 for first prizes and $50 for second prizes. On the sixth class the prizes are respectively $150 and $75. The committee of award consists of prominent school officials assisted by an architect. All the designs submitted are to become the property of the State. The movement proposed has been undertaken in the hope that it will result in more attractive and comfortable low-priced schoolhouses in the State than now exist. The drawings are to be sent to the State Superintendent of Public Instruction at the Capitol, Albany, N. Y., on or before December 1, 1887, and are to be marked "Competitive School Building Plans." Competition is limited to architects living or having a business office in the State of New York.

THE twenty-first annual convention of the American Institute of Architects assembled in Chicago on the 19th of October, and completed its sessions so as to adjourn on the 21st. It was largely attended, and many of the notable architects of the country were present. In the absence of the president, Thomas U. Walter, LL.D., First Vice-president Edward H. Kendall, of New York, presided. One of the most important pieces of business transacted was the election of officers for the new year, which resulted in the choice of the following: President, Richard M. Hunt, of New York; secretary, William A. Potter, of New York; treasurer, O. P. Hatfield, of New York. Trustees, Napoleon Le Brun, New York; L. T. Schofield, Cleveland; H. N. Congdon, New York; J. W. Root, Chicago, and Mr. Post. Committee on education, N. Clifford Ricker, Champaign, Ill.; Alfred Stone, Providence; W. R. Ware, New York; J. W. McLaughlin, Cincinnati, and Henry Van Brunt, Boston. Committee on Publication, Charles Crapsey, Cincinnati; T. M. Clark, Boston; S. S. Beman, Chicago, and George C. Mason, Jr., Newport, R. I. Secretary for Foreign Correspondence, Arthur Rotch, of Boston. Two amendments to the by-laws were passed. The first to the effect that no honorary member of the institute shall remain such upon entering upon the active practice of his profession; and the second, that any president having served in that capacity two years shall, upon reaching the age of 70 years, be made an honorary member with all the privileges of the institute, including that of voting. On the last day of the session a resolution was passed embodying the sentiment of a paper read by D. H. Burnham, of Chicago, bearing the following lengthy title: "Suggestions toward the best and speediest methods for harmonizing and utilizing all the architectural societies in the United States, so as to secure the most good for architecture, for the public, and for the profession in America; due regard being had, as concerns means, alike to individual energy and enthusiasm, and to associative experience, and as concerns ends, alike to local sentiment and to national reputation." The resolution provided for the appointment of a committee of five members to act jointly with one of a similar number, to be appointed by the Western Association of Architects, and to report upon the best and speediest means of consolidating all the architectural societies in America into one organization. A considerable number of technical papers were read, and a feature of the occasion was a visit to an unusually attractive lot of architectural drawings, displayed at the Builders' and Traders' Exchange. This exhibit attracted marked attention, and provoked discussion as well.

ANOTHER convention held in Chicago in the latter part of October was that of the National Brickmakers' Association, which met on the 18th and adjourned on the 20th. Seventy five members answered the roll call at the opening session, and 56 new members were at once admitted. After routine business had been transacted, the following officers were elected for the new year: President, D. V. Purington, Chicago; first vice-president, C. J. Holman, Sargent Bluffs, Iowa; second vice-president, George H. Smith, Haverstraw, N. Y.; third vice-president, B. W. Blair, Cincinnati; recording secretary, A. C. Blaffer, New Orleans, La.; corresponding secretary, T. A. Randell, Indianapolis; treasurer, R. C. Penfield, Ohio. A number of technical papers were read, one being upon the subject of brick making, present and prospective; another on modern brickmaking, and still a third on natural gas in brick burning. The session was characterized by a number of very earnest discussions upon technical points. The committee appointed to report on the sizes of brick to be adopted by the association recommended that common brick be 8¼ inches long, 4 inches wide and 2¼ inches thick. That pressed brick be ⅛ inch thicker. This report was unanimously adopted. Some of the statistics introduced indicate the magnitude of the brickmaking business. According to the census of 1880, there were 5631 establishments devoted to this industry, producing almost 4,000,000,000 brick. Sixty-six thousand workmen were employed and the capital invested was nearly $28,000,000. Since 1880 it is estimated that the production has been doubled. In the South alone, where the business is virtually a new one, the product is estimated at 1,000,000,000 annually.

A DIVISION of building work which is, to a certain extent, neglected in this country, is a prominent feature of building operations abroad. Here it is the custom to engage an architect and pay him a certain percentage upon the cost of the work for drawings and superintendence. The drawings are a fixed fact, and it is generally known upon the part of the owner whether or not they are supplied. The superintendence, on the other hand, is one of those intangible things in which much uncertainty necessarily exists, and frequently, by reason of neglect in this particular, very inferior work is supplied by the contractor. In Great Britain, and in some other parts of Europe, there is introduced between the architect on the one hand and the contractor on the other an active factor known as the "clerk of the works." The clerk of the works may be described as a man who understands building thoroughly, who is cognizant of the architect's intentions in the matters of design and construction, who is well informed of materials and the way in which they should be combined, and the one whose duty it is to be constantly on the ground giving attention to all details of the building and seeing that the work progresses properly. Nominally he is the architect's representative, whose special purpose is to see that the owner's interests are properly observed—in reality, he is of great assistance to the builder and renders him important services. Unless the builder is dishonest and desires to make money by slighting his work, he is always glad to have about the work a man who is competent to direct, and who is constantly on the alert to detect bad workmanship, poor material, &c.

ON large public buildings in this country it is customary at present to employ what is here designated as a "building superintendent." In many instances the salary of this man is paid by the architect. In some cases it is paid by the county or State or the managers of the building, and charged to the same account as the fees of the architect. It is in effect an additional charge in the direction of drawings and superintendence. In many instances in private work, on jobs of sufficient importance to warrant it, the contractors employ a superintendent, simply to see that their work is carefully and correctly done. In all such instances the building superintendent is of necessity a man of ability and one in whose opinion much confidence can be reposed. His work is of the utmost importance to the progress of the building. The great objection to the superintendence of building work on the part of the architect personally is that, by reason of his many engagements and pressing duties, it is performed in a careless and perfunctory manner. The architect's time is worth far more than he is able to obtain from the

performance of such work. The allowance for superintendence in the ordinary contract made between an individual who desires to build a house and an architect is far too small to justify competent work in this direction; accordingly, these duties, in many instances, become nominal rather than real. Visits are made to the building and a very general inspection is given to the operations, but the oversights are numerous, and, in general, the plan is in such poor repute that the introduction of such a scheme as we have suggested above—that of the regular employment of a clerk of the works in all operations, both large and small—would seem to be of advantage.

THE inspection given by the architect to the working out of his plans is very generally a delusion. It is considered as a sort of gratuity, and is thrown in largely in the way of an accommodation. In the busy season the average architect has a number of jobs on hand, and he does well if he spends an hour in the inspection of each job every second day. Any radical exterior defect in the mechanical work is, of course, easily detected; but such superintendence is necessarily superficial, and he cannot detect, save by accident, slouchy or dishonest departures from the specifications. Hence, the defects come to light one after another when the house is occupied. The drain is laid without sufficient slope; a furnace-pipe is run close to the woodwork; the expense of fire stops is wasted, because a corner of a room is unprotected; and so we might go on in our enumeration. A large proportion of the fires coming from defects in buildings owe their cause to just such oversights. The evils of improper plumbing are also to be laid, for the most part, at the same door. We do not want to blame the architect without putting a share of the responsibility where it belongs, and therefore we must not leave out of the account the owner. The heroic endeavors of a person having $5000 to expend to obtain a dwelling worth $7500 for the sum is well known. The great aim of the honest architect's life is to convince the builder that he must pay $7500 for a $7500 house. After this has been done, then follows the cutting and pruning necessary to save as much as possible. Of course, under such conditions, the architect does not seek to impress his patron with the idea that he ought to expend 5 per cent. or 10 per cent. of cost in inspection alone; and so the work goes on. Accordingly, there should be what we have above suggested—namely, a division of labor, and those who build should be educated to the idea that something more than mere architects' fees is necessary to secure the very best results. Inspections should be left to inspectors. The introduction of a factor in our building operations, equivalent to what is known as the "clerk of the works" abroad, would give the community a better class of buildings, and would result in increasing the satisfaction of architect, builder and owner.

A SHORT time since the new Railroad Men's Building, at Madison avenue and Forty-fifth street, New York, was formally opened. The building is the gift of Mr. Cornelius Vanderbilt, who about a year ago announced his intention to present such a club-house to the employees of what are known as the Vanderbilt roads. A brilliant company assembled at the opening exercises, and speeches were made by a number of prominent men, who briefly dwelt upon the benefits of such a club-house. A feature of the building is the library on the first floor containing over 6000 volumes, selected with special reference to the needs of railroad men, but by no means devoted exclusively to technical literature. Beside this there is a reading-room, supplied with files of all the leading newspapers and periodicals, social rooms, a gymnasium, bowling alleys, and bathing rooms with plunge bath. On the third floor is a large recreation room, and there the men can get hot coffee free of charge. On the top floor is a large room fitted up with brass bedsteads for the use of railroad men who are compelled to stay in the city over night. A hall is provided in the building, in which a series of meetings will be held of an entertaining and instructive sort. The riefest account of this building would be inadequate if no mention was made of the beauty as well as utility of the furnishings and the care that has been shown in giving an artistic finish to the structure outside and in. We wish we might dwell on this point further, for many have the erroneous impression that a building of this sort, finished and furnished plain and substantial, would answer the purpose fully as well as one in which some money had been expended purely for decorative purposes. A locomotive engineer may not be an art critic, but nevertheless he is affected, unconsciously, it may be, by tasteful surroundings, and is helped to a better performance of his work. A brass bedstead, for instance, may be no more comfortable than an iron one, but we warrant the statement that the extra cost of the first was money well expended. Mr. Vanderbilt's gift is a work of practicable philanthropy for which he deserves the highest praise, but, apart from all notions of sentiment, we think it will prove a good investment in the increased contentment it must bring about among his railroad employees.

VARIOUS statements have appeared in the papers with reference to the consumption of timber each year by railroads for ties alone. The railway tie question is every day becoming more serious, and its magnitude is only appreciated when the a ea of country that must be cleared every year to furnish the ties is taken into account. Many railway companies are instituting experiments for the purpose of determining which of different timbers is the best adapted for the purpose. An experiment of this kind was made a short time since on the Boston and Providence Railroad. Fifty ties of 10 kinds of wood, five of each being creosoted, and five of each being in the natural state when subjected to the test were employed. The woods used were ailantus, spruce, hemlock, larch, Southern pine, white oak, elm, birch, chestnut and catalpa. The results of the experiment are likely to be of interest to our readers. The ailantus was the only kind which rotted in the time of trial, whether creosoted or not. Spruce, hemlock, larch and Southern pine were pronounced too soft for the purpose. The catalpa was the softest of all, and was soon ground to a pulp by the 65 trains a day which passed over it. The white oak stood the service well, but there was the objection to it that it held the spikes too tightly and made it difficult to withdraw them for changing rails. Creosoted elm and birch are said to have given the best satisfaction.

MANY of our readers know something about the new Texas Capitol now nearing completion at Austin. Some of them are aware that it had been built under most peculiar circumstances, or rather that the money required for its erection was procured in a very peculiar manner. Texas is a large State with an abundance of mileage and yet with comparatively little taxable property. One of the legislators conceived the brilliant idea of trading land for the State House. The result was a bill which provided for 3,000,000 acres of land for a building to be worth $1,500,000. The contract was made upon these terms with a syndicate of Chicago contractors, and the building has been carried through until at present, as above mentioned, it is nearing completion. The building has greatly exceeded the cost of the original estimate, so that it is now believed that $3,000,000 will be spent upon it before it is finished. The dome is 250 feet high and the site occupies a commanding position.

ONE of the building incidents of New York recently was the sudden order upon the part of the corporation owning a stately apartment building known as "Holbrook Hall" for a vacation of the premises. The building is an imposing brick structure on Park avenue at the corner of Sixty-second street. The cause of the order of vacation was that the building had been discovered to be unsafe. The building to the casual observer looked no more like falling than it looked like flying. It has seven stories and a basement, and occupies a plot 100 feet square; it has been built only five years. It is owned by the New York Life Insurance Company, who secured it by foreclosing a mortgage before it was finished. In putting up the structure an especial point was made of having the floors very substantial, and the very carefulness with which this work was done was what made the house unsafe. Wooden floor beams were used, and instead of being placed at intervals with opportunity for ventilation, as is the common custom, they were placed close together, and, in addition, were covered with a layer of cement. Further than this, the timber employed was not of the proper kind, nor was it well seasoned. The result was that dry rot set in and proceeded with almost unprecedented rapidity. Fortunately for the tenants the danger was discovered in time, and therefore no damage in the way of an accident was done. In the remodeling of the building the floors will be entirely removed and some other construction substituted.

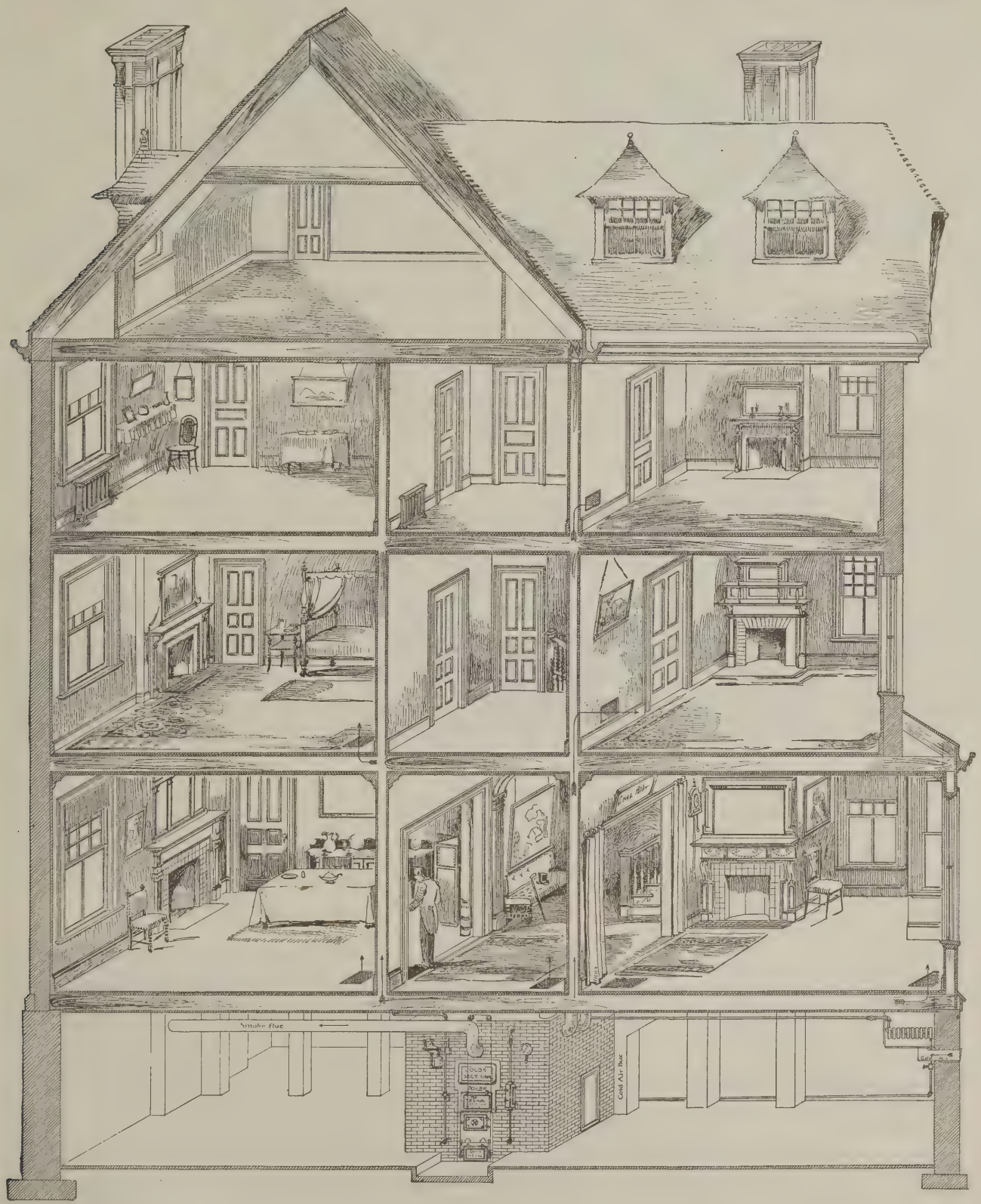
THE PLATES.

In Plates XLI to XLIII are presented elevations and plans of a house designed by W. G. Mumma, of Warrensburg, Mo., a description of which appears in another part of this issue, together with details.

In Plate XLIV of this issue we present a handsome design for a bookcase and writing-table combined. A novel arrangement is shown at the top, by which the usual cumbersome look is avoided, and an appearance of cheerfulness and diversity imparted to the article by china being distributed on a shelf provided for that purpose. Another feature by which additional effect may be gained is the colored curtain, which in the design only covers the top opening. Still greater effect might be secured if the curtain were made the whole length of the center, coming down to the table-top. The writing-table is formed by opening the center drawer, in which there is a flap made to lift. A convenient angle for writing upon can be obtained by pushing the drawer slightly back and then raising the flap on the table-top. In the pedestals there are four drawers for stationery, &c. There are also two cupboards with carved panels, a shelf being in the inside of each. This design would look well executed in either oak, mahogany or walnut.

A Scheme of Heating and Ventilating

The engraving upon this page is a reduced fac simile of an illustration which occupies a folded plate page in a new pamphlet put out by the H. B. Smith Mfg. Company, of 137 Centre street, New York, bearing the significant title of "Home Comfort." The firm named make a specialty of Gold's Improved Patent Sectioual Low Pressure Heating and Ventilating Apparatus. The engraving represents an ideal view of a dwelling showing the application of this system in various forms and with different modifications. The boiler chamber is located directly under the hall. A register connects it with the hall, thus securing the benefit of the radiation of heat from the boiler, when in moderate weather steam is not required. To the right under the floor beams, and leading into the boiler chamber, is the cold-air duct, which is open to the outer air. This is made of adequate size to assure abundant supply of warm fresh air to all the rooms. The first story of the building is warmed by indirect radiation. The heated air comes into the rooms, as shown, through hot-air pipes and registers located in the floors or side walls, as may be preferred. The second story is also warmed by indirect radiation, where practicable, through tin hot-air pipes run up in the partitions and through registers in the side walls or floors. Ventilation is secured by the open fireplaces in the different rooms. The company propose the use of vent tubes where fireplaces do not exist. The rooms on the third floor can be warmed in a similar manner to that on the floors below, or by direct radiators connected with the boiler by steam supply and return pipes. They remark that direct radiators are seldom necessary, for in most instances the whole house can be heated by indirect radiation. Steam heating, as our readers doubtless are aware, is capable of various modifications, and several different applications of the system are possible. This engraving is a happy presentation of the subject, bird's-eye view style, and will not fail to interest many who examine it.

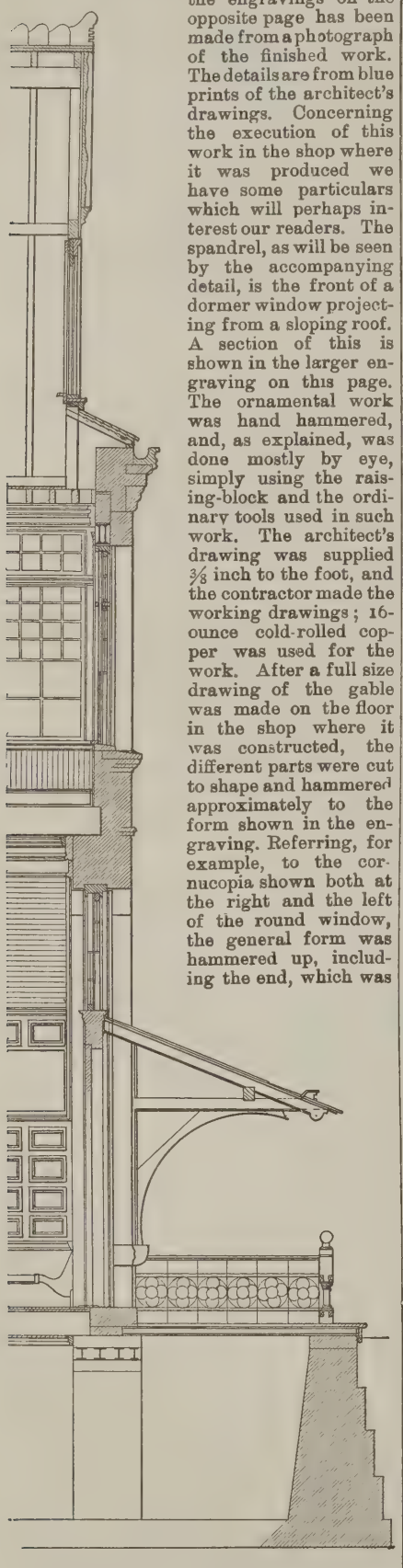


Sketch of House Illustrating Different Systems of Steam Heating.

The building business in Detroit for the past year has been very active. According to a detailed statement published in a recent issue of the *Fress Press*, it appears that over $4,000,000 have been expended in buildings during the year. Two thousand new residences are included in the improvements and some 32 manufacturing establishments.

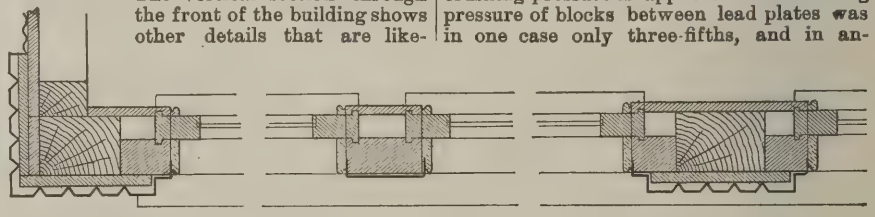
A Characteristic Job of Sheet-Metal Work.

The accompanying illustrations represent features of the sheet-metal work, together with the wood construction over which it was applied, of the new Harrisburg passenger station. The contract for sheet metal work was executed by J. L. Arnold, of Lancaster, Pa. The spandrel piece shown in the engravings on the opposite page has been made from a photograph of the finished work. The details are from blue prints of the architect's drawings. Concerning the execution of this work in the shop where it was produced we have some particulars which will perhaps interest our readers. The spandrel, as will be seen by the accompanying detail, is the front of a dormer window projecting from a sloping roof. A section of this is shown in the larger engraving on this page. The ornamental work was hand hammered, and, as explained, was done mostly by eye, simply using the raising-block and the ordinary tools used in such work. The architect's drawing was supplied ⅜ inch to the foot, and the contractor made the working drawings; 16-ounce cold-rolled copper was used for the work. After a full size drawing of the gable was made on the floor in the shop where it was constructed, the different parts were cut to shape and hammered approximately to the form shown in the engraving. Referring, for example, to the cornucopia shown both at the right and the left of the round window, the general form was hammered up, including the end, which was made in a separate piece and soldered against the front. The fanlight leaf work in front of the cornucopia was made in pieces, with a soldered joint along the rib. Referring now to the elevation of the dormer, we are informed that the ornamental crown molding of the horizontal cornice and the rosettes below the same were of stamped work. These general particulars will enable our readers to judge of the success of the work, when the statement is made that the engraving in no respect exaggerates the photograph which has been supplied us. The work was under the immediate management of Mr. J. E. Pohl, foreman for Mr. Arnold. The horizontal section presented herewith indicates the manner of constructing the dormers, showing the woodwork and how the pilaster finish was put around the same. The vertical section through the front of the building shows other details that are likewise of interest to our readers. The designs of this work were prepared in the offices of the Pennsylvania Railroad Company, under the supervision of W. H. Brown, chief engineer. Mr. W. C. Boles, assistant engineer, was in charge of the building.



A Characteristic Job of Sheet-Metal Work.—Vertical Section through Front of Building.

Elevation of Dormer.—Scale, ¼-Inch to the Foot.



Horizontal Section through Framing of Dormer on Line T U.

Crushing Resistance of Stone.

Prof. W. C. Unwin, in a paper on the above subject, presented at the recent meeting of the British Association, remarked that 20 years ago it was common in experiments on crushing to bed the test specimens of rigid materials like stone on lead plates, with an idea of securing uniform distribution of pressure on the faces at which the crushing pressure is applied. Professor Unwin has long had the opinion that to support blocks for crushing on a plastic support is wrong in principle. Hence, in experiments on the crushing of stone, and of Portland cement and concrete, he has adopted the plan of preparing the faces on which the crushing pressure acts with a thin layer of plaster. This can easily be worked to smooth and parallel surfaces, used to receive the iron plates of the crushing shackles directly if necessary; but he generally interposes a sheet of mill-board, which is a very hard and only slightly compressible material. It seemed desirable to try what was the difference of the crushing strength of blocks supported in these two ways. Two series of 4-inch cubes of Portland stone and Yorkshire grit were obtained of very uniform quality. Results of tests which were given showed a very great reduction of strength, which occurs when a thin plate of plastic material, like lead, is used on the faces to which the crushing pressure is applied. The crushing pressure of blocks between lead plates was in one case only three-fifths, and in another only three-sevenths of that of blocks prepared with plaster and crushed between millboard. One block was cemented carefully between two rigid iron plates with parallel surfaces, and this carried a little more, but only a little more load than the block prepared with plaster and crushed between loose millboards. An examination of the mode of fracture of the blocks showed why the lead has so dangerous an effect on the strength. The blocks crushed between millboards sheared approximately at 45° in the way well understood, forming regular pyramids; but the blocks crushed between lead broke up into a number of vertical prisms with nearly vertical faces. The lead flowing under the crushing pressure produced by friction a tension in the block at right angles to the crushing pressure, tearing the block in pieces and completely altering the angle of fracture. The pressure of fluidity of lead is known to be from 1½ to 3 tons per square inch, and these pressures were exceeded in the crushing experiments. The result seems important, because it is a still common practice to use lead, or deal or some other plastic or compressible material in crushing experiments, and it is not generally known that this has the effect of diminishing the crushing resistance.

Writing on the subject of colored mortar for brickwork, Sir R. Rawlinson says: "The common bricks of almost any district may be sorted so as to produce contrast in tint or 'tone'—red and yellow or 'cream color.' This tint of the bricks may be preserved and hightened by using mortar of the same tone or tint. Furnace ashes and lime will produce a dark mortar, pounded red brick or red tile mixed with lime will give a red tone to mortar, and cheap mineral colors may be added to mortar for pointing. The color of mortar is sadly neglected, as generally the same white lime and sand are used for all tones of color in bricks, and not unfrequenty white putty-mortar is used for pointing the reddest as well as the lighest colored bricks—the light colored work having harmony of breadth and keeping—the red portion being frittered and broken up by the contrast betwixt bricks and beds and joints"

Chinese Brickmaking.

As the Chinese are excellent potters, says James Main, it is not to be wondered at that they are also excellent brickmakers. This is sufficiently apparent not only in respect to the perfect forms and durability of their common building bricks and tiles, but in the great variety of forms and different sizes of their brick. For common wallwork in courses, their bricks in dimensions resemble those of Europe; but in so warm a climate as that of the south of China many ornamental lozenged openings are required in the walls of houses to promote ventilation, and many ornamental projections, either vertical, horizontal, or curvilinear, are required by the national taste. To execute these features, the builder never need cut a brick; the proper forms are furnished by the brickmaker according to orders issued from the architect. Hence there are molded headers for plinths, beveled stretchers for sills, the same for lintels, &c. For mullions they have bricks of various sizes and designs, which fit as parts of the general structure with great exactness, whether as referable to ornamental effect or security of the building. Economy in all things is the ruling passion of the Chinese, and to this may be attributed the pains they bestow in preserving every particle of their brick earth, and saving the time of the builder, which would be lost in reducing his bricks to the required form, and which, it seems, they consider more than compensates for the expense of the molds.

Sheet Metal Work on the New Harrisburg Passenger Station.—Detail of Dormer Gable, from a Photograph.

Brick and Beaded Sheets.

The Sagendorph Roofing and Corrugating Company, of Cincinnati, Ohio, are just introducing two specialties that will, no doubt, command the attention of architects and builders, as well as sheet-metal workers. One of these is designated as brick sheets, and is illustrated in the first of the accompanying engravings.

Sagendorph's "Brick" Sheets for Siding.

A sheet of iron, instead of being corrugated or crimped, as is usual in treating metal, is embossed or pressed into the form of courses of brickwork. The depth of the depressions in the surface is about $\frac{3}{32}$ inch. In laying, the sheets may be used either with the depressions of the joint against the foundation, or in the reverse way, as may be preferred. If the depressions of the joints are placed against the foundation, a slight air chamber is formed equal to the surface of the bricks represented. On the other hand, if the sheet is placed in the reverse manner, the depression of the mortar projecting, the air chamber is contracted to the space of the joint, the surface of the bricks laying against the foundation. Sheet iron treated in this way is, of course, intended for siding, and, where it is judiciously managed it forms a very striking imitation of a brick building. The sample before us is painted in about the usual color that is employed with corrugated iron and roofing iron, with the imitation mortar joints in black. The effect is very good. We learn that the company produce this material in sheets 4 feet long and 28 inches wide, in both black and galvanized iron. It is packed either 4 or 8 squares to the crate. The plain sheets are painted on both sides, the striping as above referred to being done after the sheets are in position on the building. The beaded iron is shown in the second of the accompanying engravings, and is a *fac simile* of that already described, save that the vertical joint lines are lacking. It is manufactured in the same shape, and put up in the same size packages. The claim is made for this material that it is as durable as brick, and has the advantage of being subject to low insurance rates.

New Pattern of Beaded Siding.

ROOFING NOTES.

Wide Span Roofs.

One of our English exchanges contains some particulars concerning the roof over the Machinery Palace being erected for the French exhibition of 1889. The span of this roof, which is nearly 500 feet, gives it a rank above anything that has been heretofore projected. The particulars will, no doubt, be of interest to our readers: "Roofs of great span are not uncommon in England. Till the construction of the iron roof over the Olympia, at Addison road, St. Pancras station roof, which has a span of 239 feet, held the reputation of being the greatest. But these roofs are to be exceeded by one designed in connection with the Machinery Palace being erected for the French exhibition of 1889. The project of a machinery gallery was decided upon in May last, and the work was submitted to contract. M. Dutort is the architect of the Machinery Palace, and, with the aid of MM. Contamin, Charton and Pierron, the details of the metallic pieces have been arranged. The gallery is constructed entirely of steel—the first great exemplication of the value of steel for structural purposes of this kind—and, when finished, the structure will embody the progressive developments made in the art of the engineer. The gallery will be of rectangular shape in plan, having a length of 1387 feet and a width of 492 feet, or an area of 672,404 square feet. The main span will be 362 feet clear of the rods. Each truss forms a four-centered arch of bold springing curvature, and will consist of two half arches resting at their bases and apices upon pivots. Each rib is on the open lattice principle, with long and short panels. These are connected by vertical purlins, four on each side of the apex. The maximum hight from the ground to the apex or under pivot is 147.5 feet, which hight would allow the Vendome column to stand beneath. Open spandrel pieces of iron fill up the ribs at the haunches, by which the roof covering is continued straight to the outer guttering. There are 19 bays. The center bay is 76 feet, and the others 70 feet each, in width, and the end ones each 83 feet. Projecting pavilions roofed on a lower level abut against the central hall, thus adding greatly to the total superficial area. By the employment of steel M. Contamin and his colleagues have been able to abtain strength with extreme lightness, so that the trusses will not

exceed 24 pounds per square foot. If this be so, the gallery will possess the lightest metallic roof of any exhibition. The former exhibitions had metallic frameworks weighing from 30 to 34 pounds to the square foot. Though it is not safe to compare structures of different design, it would appear the experiment at the machinery palace of the Paris Exhibition of 1889 will confirm the opinion of engineers that steel can be used for roofing with economic results that cannot be obtained in iron.

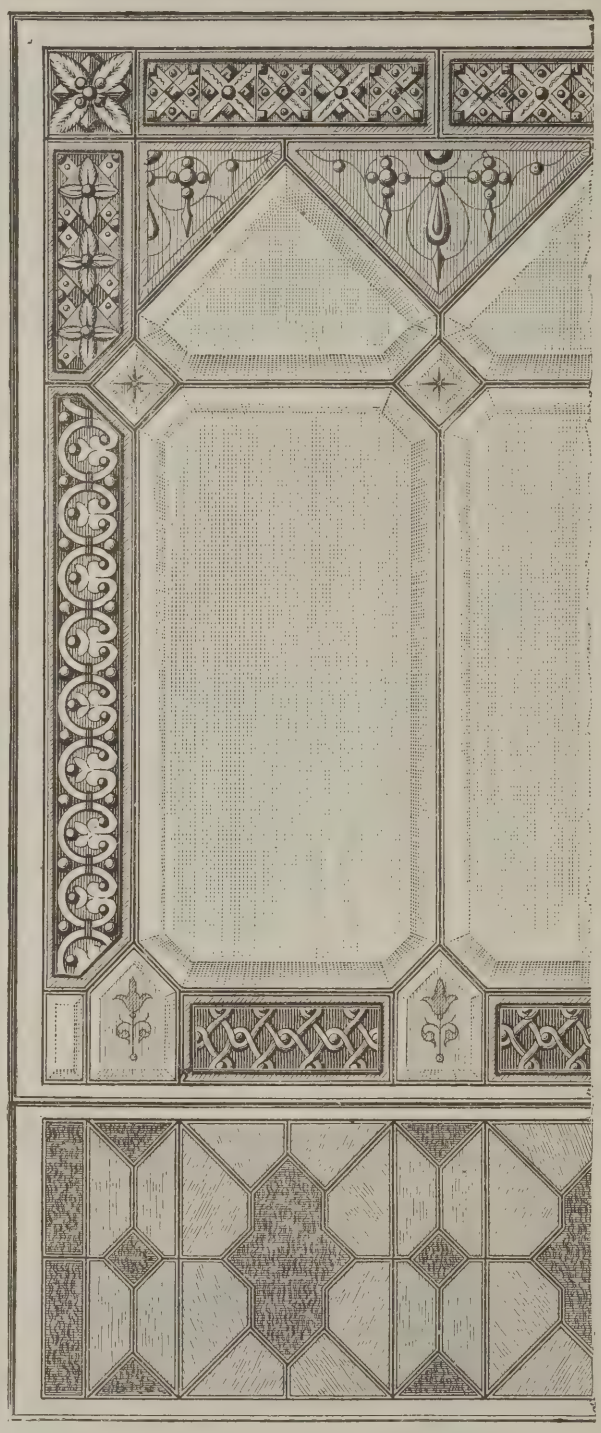
Items.

THE IMPORTANCE of slate as an article of manufacture and commerce is afforded by an article which appeared a short time since in a Minneapolis paper: "Slate is not confined to its use as a roofing material by any means, but, on the contrary, is probably more universally used than any other stone. In composition and texture it is admirably adapted to the reception of carved and molded designs, is susceptible of a high polish, and possesses a great power of resistance to the principal destructive elements, besides having the additional merit of wide range of color, embracing black, dark blue, purple, clouded green, gray-clouded green, light green, and a clear bright red. The scope of consumption is rapidly expanding, and among the uses to which slate is applied the following may be enumerated: Flagging, flooring tiles, molding for tiles, vestibule trimmings, slabs, &c., wainscoting, mantels, hearthstones, steps, risers, platforms, sills and lintels, turned balusters, laundry and bathtubs, sinks and wash trays, meat and water tanks, refrigerator and cooling-room shelves, cistern linings, brewers' vats, mangers, butchers' and carriers' tables, bar fixtures, billiard-table beds, urinals, school slates and blackboards, counter tops, vault work, grave linings and covers and memorial tablets. Of the above no record of production or value can be obtained that would prove at all useful as a basis for estimates. Possibly a faint idea of the proportions devoted to these various uses might be obtained from the production of the Slatington (Pa.) section, where, besides an output of 108,000 squares of roofing slate, there were also made (in 1885) in round numbers 39 900 cases of school slates, 31,850 pieces, or 1430 cases, or 27 carloads, of flagging, 5900 cases of blackboards, 30 cases of mantels and hearths and 47 carloads of shaved slate."

WE HAVE RECEIVED from the New York Iron Roofing and Corrugating Company a copy of their catalogue, a handsome quarto pamphlet, bound in a very attractive cover. The book is the same, with the exception of headlines and addresses, as that issued by other branches of the Sagendorph Iron Roofing and Corrugating Company, of Cincinnati. The New York concern possesses most excellent facilities for manufacturing, which have been put in place under the personal supervision of the manager of the Cincinnati organization. Henry W. Warren is president and Lewis Moss treasurer.

THE CINCINNATI CORRUGATING COMPANY, of Cincinnati, Ohio, report trade very active this fall. They inform us that the demand for their productions is fully up to the average. Their manufacturing facilities have been kept equal to the demands made upon them, so that they are shipping work promptly. They claim to have the most extensive plant ever devoted to the manufacture of iron roofing.

THE LLOYD IRON ROOFING AND PAINT COMPANY, corner of Lake and Clinton streets, Chicago, have just issued a very handsome catalogue of their specialties. It is a pamphlet of 32 pages, with a pearl-colored paper cover. The outside page of the cover bears a well-executed lithographic design emblematic of the company's business, consisting of fluted columns extending along each side of the page, supporting a curved sheet of corrugated iron, the whole of which forms a border to the company's name and address inserted in ornamental letters, with their monogram in one corner. The cover is tastefully finished in blue. The contents embrace illustrations, descriptions and methods of using the iron roofing and siding manufactured by this company. The most minute details are carefully illustrated by elaborate engravings. Roofing problems of all kinds are elucidated for the benefit of the inexperienced. For the purpose of showing the various methods in which their goods can be used many forms of roofs are illustrated, and designs of buildings are shown with roofs and sides covered with iron. Illustrations and prices are given of tools specially adapted to laying standing-seam and roll-cap roofing. Useful directions how to measure buildings for roofing and corrugated siding form an important page of the catalogue. The uses of corrugated iron in various modes of construction constitute an interesting chapter. Ceiling decorations in corrugated iron are handsomely illustrated. A portion of the space in the catalogue is devoted to setting forth the merits of Obelisk metallic paint and Obelisk iron cement. The paint is made from iron ore and linseed oil, and forms a most excellent protection of iron roofs and siding from the action of the elements. The cement is made from the same materials, and is intended to stop up holes and prevent leaks. It is also an excellent flashing material.



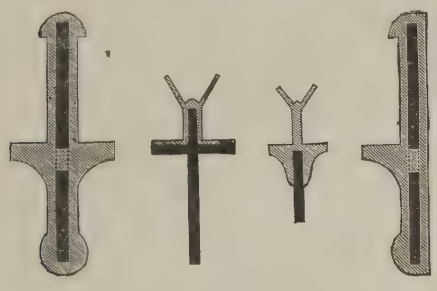
Composite Sash Bars —Fig. 1.—Half Window of Dining Room. —Residence, 230 West 129th Street, N. Y. City.

Composite Sash Bars.

A new departure in decorative glazed work is announced by George Hayes, of No. 71 8th avenue, New York City. A peculiar form of bar is employed, the nature of which facilitates construction which has heretofore been very difficult to make. Fig. 2 of the accompanying engravings represents full-sized sections of the bars. As the name indicates, they are composed of different metals. They may be described as being made of lead reinforced with iron or steel cores, through and around which the lead is thoroughly amalgamated. By this combination, all the advantages of lead glazing are secured, while, at the same time, the the stability of iron is retained. In addition to this, the bars are of a nature to be readily bent and to be combined upon various plans. The special advantage secured by this construction is the strength that is obtained in small compass. In the manufacturer's circular it is pointed out that the mullions of church windows, which, as commonly constructed, occupy from 2 inches to 6 inches of dead surface can, by this plan, be replaced by a light sash bar of about ½ inch thickness. Where the design calls for heavy columns or tracery, it may be carried out by doubling the sash bar and filling in the interstices with glass, using opaque, translucent or transparent as desired. The invention also has its application in the construction of windows for stores, offices, hotels, &c. In lieu of costly single or large panes of plate glass, rendered expensive by the import duties which are imposed, and also by the special expenses attendant upon handling large plates of glass and the risk of breakage, small panes can be used with many advantages. Among those recited in the circular before us are small cost, and a more beautiful and attractive appearance. Windows of dwellings may be gotten up without adhering to the conventional forms of plain squares, and a new departure in architectural effect is thereby inaugurated. The sash here illustrated is glazed with polished plate glass, beveled, and, in lieu of the lead bands at present in use, reinforced sash bars and light molded framework are applied. In the matter of glazing the user has the choice of cast plates, cut ondoyant, opalescent, antique, cathedral and chipped glass, with variations in the nature of crown disks, jewels, &c. Those who have examined stained glass work know to what extent the design is marred by the iron cross bar to which of necessity lead work is attached for support. By the use of the reinforced lead bars here shown complete rigidity is attained, and the cost is not increased. Since the bars can be bent into various and elaborate forms, there is scarcely any limit to the number of designs that may be produced. Such is the adaptability of this device that an ornamental window guard of band iron or even

woven or interlocked wirework may be taken as a foundation, and be clothed with the lead-frame and thus transformed into a beautiful and strong sash.

The two larger engravings presented on these pages represent portions of windows in which the sash bars here described are employed. The first represents one-half of a window to the dining-room of the residence No. 230 West 129th street, New York. The other represents a modification of this design, in which circles are substituted for angles. The bar employed is one of those shown in the smaller cuts presented herewith. These windows possess several novel features beyond that of being constructed with the peculiar sash bar. The transparent panes are of polished plate glass with beveled edges. The margins and translucent panes are of tinted opalescent glass interspersed with jewels of various colors and forms, cut and uncut. The squares, which are placed diagonally and thus pointed at the top, are of cut glass, beveled, and are ventilators operated by sliding, as a drawer-front. They are pushed outward to open



Composite Sash Bars.—Fig. 2.—Sections of Hayes's Composite Sash Bars.

and inward to close, and maintain their ornamental appearance whether opened or closed. The lower portion of the window is glazed with tinted ondoyant glass and is not an opening sash, but, still, is so arranged that during the summer it acts as a ventilator to the room, while during the winter the cold air supplied passes through it to the furnace. At all times it affords light to the cellar, but has no other connection therewith. Without illumination and color it is difficult even to approximate on paper the beauty of the work that may be accomplished by such a plan as is here described, or as is displayed in the windows referred to.

The Layman, the Architect and the House Manufacturer.

In a recent issue of the *Art Age*, a periodical that is giving attention to art matters in building as well as in other directions, we find an article bearing the above title that we think will be of interest to our readers if republished. A prominent architect in New York City received a letter from a would-be client, and thinking the communication was somewhat peculiar in its request, forwarded it to the Editor of the *Art Age* for his opinion. The opinion is given at length and contains some remarks that will undoubtedly command the attention of our readers:

MR. BRUCE PRICE, New York City:

Dear Sir—If I send you a sketch of plan of a house I wish to build in the country, will you send me sketch of elevations of same? I wish to have as complete and attractive a home as possible for $1600 to $2000, and wish to select the elevations from a number of designs and give the architect whose elevation we accept the drawing of the plans, elevation details and estimates. Please let me hear from you. I. C. G.

243 SUPERIOR STREET, CLEVELAND, OHIO.

To this the Editor of the *Art Age* replied as follows: "This letter, instead of seeming curious, appears to us to be the quintessence of commonplace. If Mr. Price does not choose to answer it, that is mainly his affair, and he is to be congratulated on having an extensive practice which enables him to ignore such possible commissions.

"But is there not another question of greater import suggested by this letter and Mr. Price's treatment of it? A layman in good faith makes a fair business proposition to a professional architect, and the architect ignores the layman. Still, it is not supposable for an instant that the layman in consequence goes houseless. He probably will get his design from some amateur, or a carpenter, or house manufacturing firm which gives courteous attention to all correspondence and conducts its affairs as if architecture were strictly a business and not an art.

"Take it all in all, our sympathies are with the layman. He does not know that architects have been so often cheated out of their designs by correspondents that they are not only chary of submitting drawings on approval when the possible order is small, but, to take Mr. Price as a type, they utterly ignore many of their letters. The layman also has no means of knowing who are the younger architects who have ability, but who, being comparatively unknown as yet, work for low fees, and, as a result, he is drawn into the house manufacturer's net—for the house manufacturer is always on the alert for customers, even going by advertisements into the by-ways and hedges to find them.

"If Mr. Price is a fair example of the architect view of this matter, there will be, in the future, even more bad design in the small houses which make up the greater number of the homes of the people than there is found at present. When a layman writes to the best architect he knows of, and that architect neither answers his letter nor refers it to a competent fellow-architect who is willing to take small commissions, there is no resource that we can see for the layman but the tender mercies of the house manufacturer.

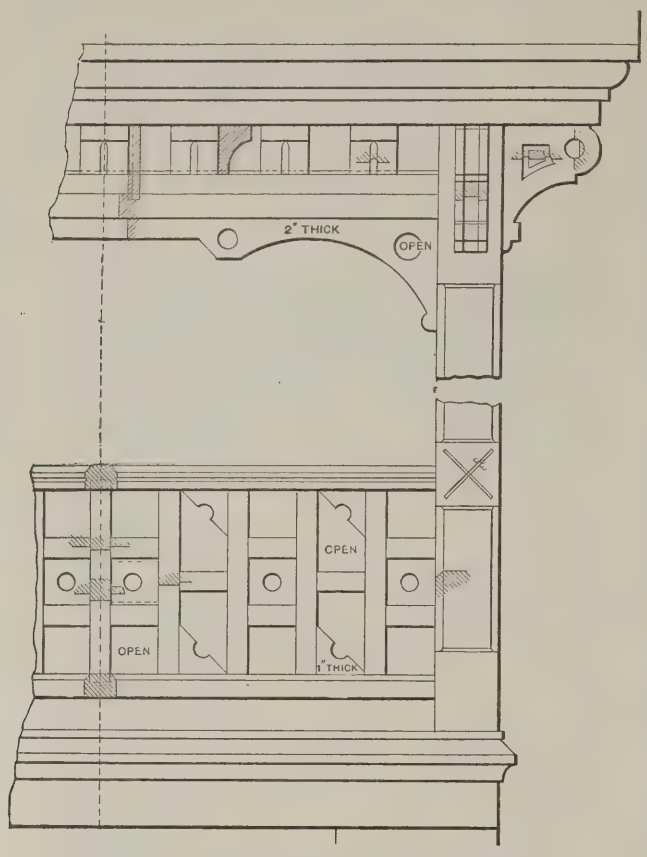
"The architect should be able to protect himself against fraud as well as the house manufacturer. That stands to reason. Therefore, there must be some mistaken idea on the part of architects as to how such correspondence can be treated profitably. We think the first thing to do is to gain the layman's confidence so that he may be assured that he is not to incur an indefinite obligation for professional services — of which obligations all laymen have the same dread as they do of lawyers' and physicians' bills. This step requires tact and brains, which we may add with considerable zest, some men possess and others do not. The second step is to have the client understand that invariably he must pay something for the advice he receives according to its nature, the scale of charges being as explicit as possible. The third step is to explain that there is a difference between a mere note or memorandum suggestion in pen and ink or water color and an elaborate design. In taking these three steps taken successfully, we think there is a large field of practice to be recovered to architects, and many large as well as small fees to be earned.

"Every profession has to be protected by its members. 'Every man is a debtor to his profession, from the which, as men do of course seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help thereunto.' If architects' offices are dull while building is active; if unskilled men advertise their services while skilled architects treat the applicant laymen with contempt; if the pretentious tyro and the immigrant foreigner thrive while others fail—at least some of the causes are found in the offices of the architects themselves."

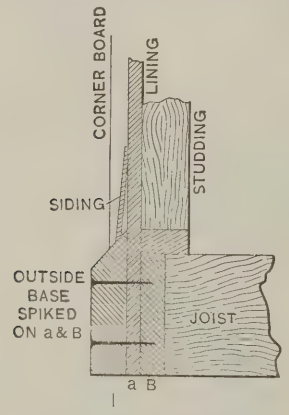
Fig. 3.—Modification of Design, Substituting Circles for Angles.

Speaking of decoration in architecture Ruskin says: "The first thing we have to ask of the decoration is, that it should indicate strong liking, and that honestly. It matters not so much what the thing is, as that the builder should really love and enjoy it, and say so plainly. The architect of Bourges Cathedral liked hawthorns; so he has covered his porch with hawthorn—it is

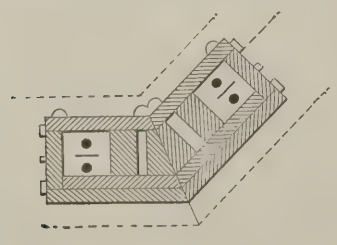
a perfect Niobe of May. Never was such hawthorn; you would try to gather it forthwith, but from fear of being pricked. The old Lombard architects liked hunting; so they covered their work with horses and hounds, and men blowing trumpets two yards long. The base Renaissance architects of Venice liked masking and fiddling; so they covered their work with comic masks and musical instruments. Even that was better than our English way of liking nothing, and professing to like triglyphs. But the second requirement in decoration is sign of our liking the right thing. And the right thing to be liked is God's work, which He made for our delight and contentment in this world. And all noble ornamentation is the expression of man's delight in God's work."



Details of House Designed by W. G. Mumma.—For Elevations and Plans see Plate Pages.—Veranda of Front Elevation.—Scale, ½ Inch to the Foot.



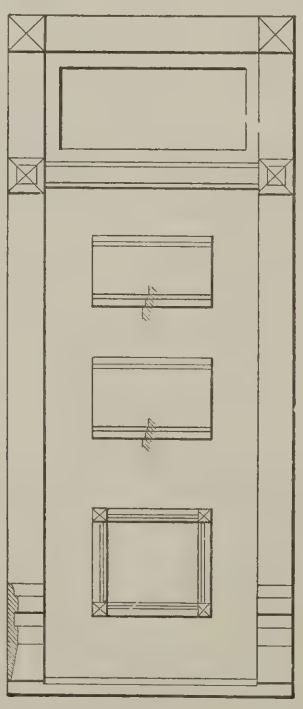
Section of Base and Sill.



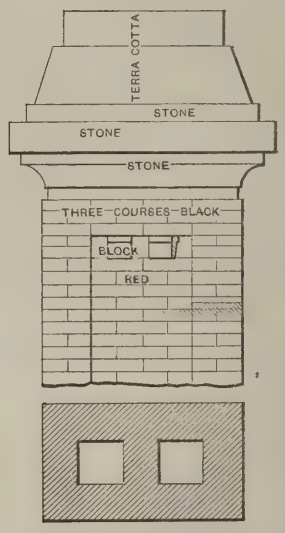
Section through Corner of Bay.

Suburban Residence.

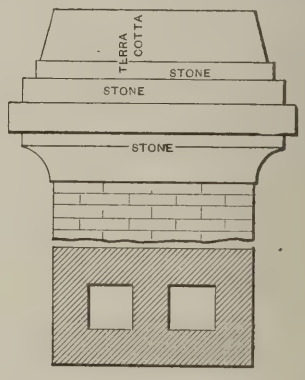
In our plate pages we present the elevations and plans, and herewith we show the details of a study in suburban architecture prepared by W. G. Mumma, of Warrensburg, Mo. The author states that his a im has been to produce a convenient, neat and tasteful residence, adapted to be built at a moderate cost. Some features out of the ordinary run will be noticed in both design and construction. From the architect's specifications we gain that the house is intended for a common city lot, and can be adapted for use upon a corner lot. The building is to be placed 3 feet above the grade line. The basement story is to be 8 feet in the clear, the first story 10 feet, and the second story 9 feet 6 inches. Eight rooms are shown, exclusive of halls, pantry and bathroom. The front entrance leads to a reception hall, in which are winding stairs arranged with an easy ascent and provided with a graceful turn out at the bottom. The hall has a fireplace, and leads directly to parlor, sitting-room and dining-room. The parlor has a bay-window in the front of good proportions, with an arch across the opening. Between the parlor and the sitting-room there is a sliding door. The sitting-room is large and is conveniently accessible from all the other rooms. The dining-room and kitchen are connected by a passage which may be used as a china closet. A dumb waiter is put in this passage reaching from the basement to the second story. The pantry is also connected with the dumb-waiter, thus making it available for passing all kinds of articles to the different floors of the building. The rear stairs start from the pantry. The rear veranda connects with both kitchen and dining-room. The laundry is located in the basement under the kitchen and pantry. Ample storerooms are provided in the basement, which is finished with a concrete floor. The bedrooms, the author points out, are provided with wardrobes instead of closets. He states that closets can be furnished in the different rooms simply by putting in partitions. He is under the impression, however, that wardrobes are better. They are to be built up solid in the room, extending to the ceiling and made a permanent fixture. They are to be provided with panel doors. With reference to the cost of the building, the author estimates it to be worth about $5000 in the locality in which he lives, and that similar work has been done for this price.



Front Door.—Scale, ⅜ Inch to the Foot.



Top of Middle Chimney.—Scale, ⅜ Inch to the Foot.



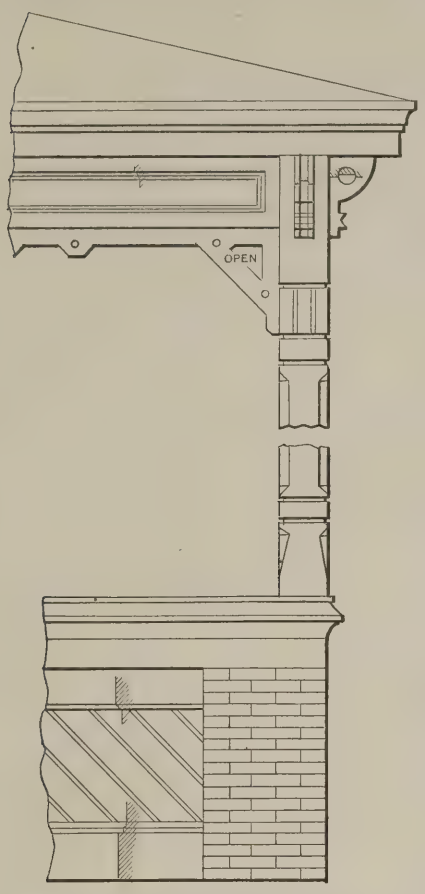
Top of Parlor Chimney.—Scale, ⅜ Inch to the Foot.

He states that labor and material are to be had there at low figures. We omit some general particulars concerning materials, &c., which are not likely to be of special interest to our readers.

Architectural Styles.

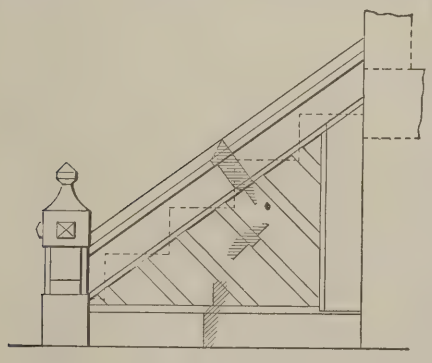
The following extracts from the writings of E. B. Lamb on the production of architectural forms are of interest to all who give any attention to the appropriateness of design to the material used. For example, it is often urged that sheet-metal cornice-work, however adequately constructed, is but a servile imitation, because it employs the forms and shapes which were originated in stone and other materials in use before sheet metal was known. The ablest writers who have touched at all upon this point have been anxious that a style should be devised in consonance with the material used. This evidently is the idea applied broadly to all materials whatsoever by the author referred to. Mr. Lamb says: "The reproduction of ancient forms can never be the means of continuing the art as it was practiced by those whom we affect to imitate

by merely doing exactly as they did under widely different circumstances. The adoption of the improvements necessarily resulting from advancing refinement has ever influenced architecture. The whole history of



Details of House Designed by W. G. Mumma. —Rear Veranda.—Scale, ½ Inch to the Foot.

the art, in our own country in particular, attests this. Almost every successive century produced some marked change—some one of those distinct modes which we designate 'styles,' though all belonging to one general style. Be it especially observed, too, that such successive changes were always gradual and uniformly progressive; there was in those days no such thing as the reassumption of any former style. Wherefore there is reason to believe that, had not an entirely new direction been given to architecture in the sixteenth century, the very latest Gothic or best Tudor might have been carried on much longer, and would have

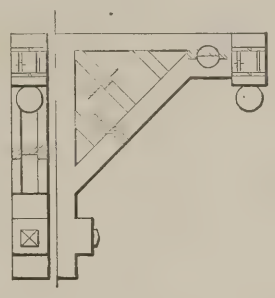


Finish of Front Steps.—Scale, ⅜ Inch to the Foot.

acquired fresh spirit and energy. We of the present day are, on the contrary, at once exceedingly strict and exceedingly lax, most bigoted in some respects and most latitudinarian in others; for, although shocked at the idea of presuming to treat any one style with artistic freedom, our taste is so pliant that it accommodates itself to nearly all styles alike, just as whim or fashion brings them by turns into vogue. For all the styles we possess we are entirely indebted to those who have gone before us, not even attempting to make any addition of our own to the general stock; whereas, by continuing the same spirit which marked the works of preceding ages we should in a short time work out a style accommodated to our actual requirements, and at the same time marked by æsthetic quality."

Horticultural Structures.

We have received from Josephus Plenty, with principal offices at No 144 Pearl street, New York, and No. 6 South Merrick street, Philadelphia, and with factory in Newark, N. J., a copy of his catalogue of conserva-

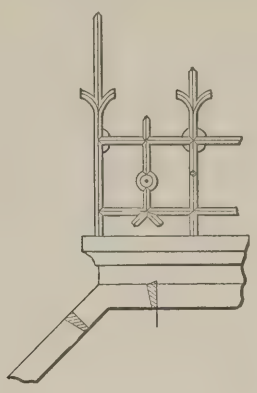


Bracket in Gable of Left-Side Elevation — Scale, ⅜ Inch to the Foot.

tories, green houses, plant houses, vineries and other similar structures. Mr. Plenty makes a specialty of horticultural buildings, including in addition to those above mentioned winter gardens. He employs among other features the Helliwell patent system of glazing and the Wood patent system of ventilating. In an address to the trade contained in the catalogue, dated March, 1887, the statement is made that over 50,000 square feet of work have been executed in the space of two months and that he has recently enlarged his factory and put in new and improved machinery. In addition to horticultural buildings the catalogue contains a skylight department, in which also attention is given to glass roofs in general. We understand that the sash bars of No. 16 gauge are made of zinc or of copper, and accordingly are free from some of the objections applying to galvanized iron. Sharp angles or bends are avoided, and the form is such as to afford ample provision for conveying away the water of condensation. The Helliwell system of glazing, already referred to, is employed in this work. The catalogue contains some 50 pages, and is profusely illustrated with engravings of glass roofs, prominent among which may be mentioned the roof and dome of the Kings County Water Company, at Coney Island, conservatories, both interior and exterior views, grape houses, tropical houses, &c. The work is of the greatest interest to those who have structures of this kind to supply, and the copy before us was furnished, partly, at least, in reply to an inquiry that appeared in these columns a short time since concerning portable green houses. We understand that many of the structures shown are finished and shipped complete.

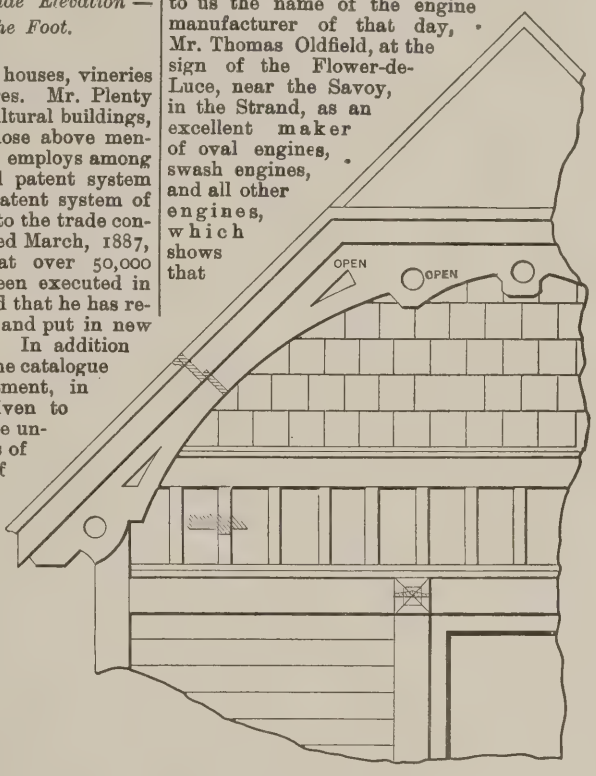
The Turning Lathe.

The origin of the turning lathe, according to Willis, is lost in the shades of antiquity, and the saw-mill, with a complete self-action turned by a water-wheel, is represented in a manuscript of the thirteenth century at Paris, and is probably of much earlier contrivance. The lathe was, in process of time, adapted to the production of oval figures, twisted and swashwork, as it is called; and, lastly, of rose-engine work. The swash, or raking moldings, were employed in the balusters of staircases and other ornaments at the period of the rennaissance in architecture, about the end of the sixteenth century, and therefore the swash-lathe assumes somewhat of the character of a manufacturing machine. But the simple lathe was much



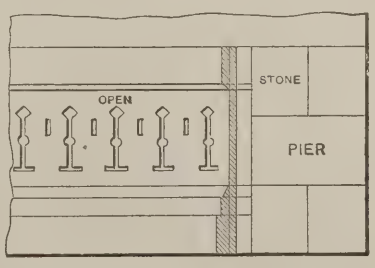
Deck Cresting.—Scale, ½ Inch to the Foot.

employed in screen and stallwork during the Middle Ages. The first real treatise on turning is Moxon's, 1680, which gives us a valuable picture of the state of the art at that period; and he has preserved to us the name of the engine manufacturer of that day, Mr. Thomas Oldfield, at the sign of the Flower-de-Luce, near the Savoy, in the Strand, as an excellent maker of oval engines, swash engines, and all other engines, which shows that



Gable of Right Elevation.—Scale, ⅜ Inch to the Foot.

such machines were in demand. A few drawings of such machines occur in earlier works, beginning with Besson, in 1569. From the treatise of Plumier, published at Lyons in 1701, we learn that turning had long been a favorite pursuit in



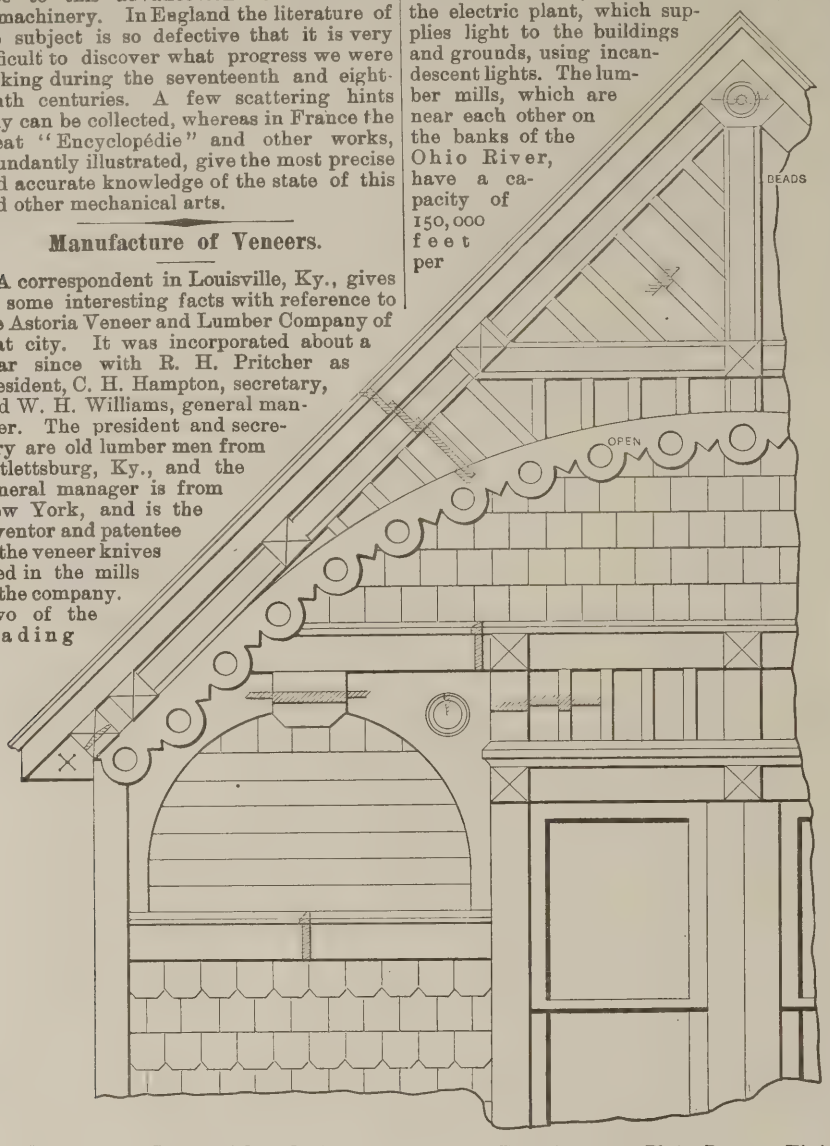
Ground Finish of Front Veranda.—Scale, ⅜ Inch to the Foot.

France with amateurs of all ranks, who spared no expense in the perfection and contrivance of elaborate machinery for the production of complex figures. This taste continued, at least, up to the French Revo-

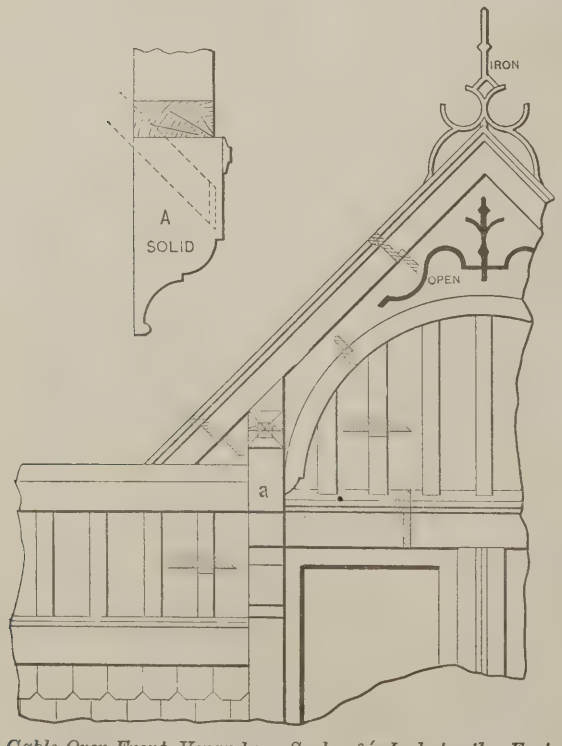
lution, and contributed in a very high degree to this advancement of this class of machinery. In England the literature of the subject is so defective that it is very difficult to discover what progress we were making during the seventeenth and eighteenth centuries. A few scattering hints only can be collected, whereas in France the great "Encyclopédie" and other works, abundantly illustrated, give the most precise and accurate knowledge of the state of this and other mechanical arts.

Manufacture of Veneers.

A correspondent in Louisville, Ky., gives us some interesting facts with reference to the Astoria Veneer and Lumber Company of that city. It was incorporated about a year since with R. H. Pritcher as president, C. H. Hampton, secretary, and W. H. Williams, general manager. The president and secretary are old lumber men from Catlettsburg, Ky., and the general manager is from New York, and is the inventor and patentee of the veneer knives used in the mills of the company. Two of the leading saw-mills at Louisville were purchased and considerably enlarged, while being remodeled throughout. A four-story brick building was erected for the veneer mill. Power is supplied by four large Buckeye engines, while a fifth one, somewhat smaller, runs the electric plant, which supplies light to the buildings and grounds, using incandescent lights. The lumber mills, which are near each other on the banks of the Ohio River, have a capacity of 150,000 feet per day. The portion of our correspondent's letter which will specially interest our readers relates to the manufacture of veneers. Three veneer knives and one saw are employed, which, when running full, turn out 300,000 feet of veneering per day. Half logs or flitches, which are the raw material, are steamed in large vats. After becoming thoroughtly hot, they are taken out with a derrick and placed on the knifes and carried by an obliquely horizontal motion, making the cut in an easy movement. The knife is stationary. From one flitch there are usually cut from 7000 to 8000 feet of veneering, which after careful culling is taken up to the drying floors. A single day suffices to bring it to a condition to admit of baling and shipping. Some very handsome specimens of work were exhibited by the company at the Louisville Exposition, including some specimens of hard wood in the rough. Among these may be mentioned some poplar boards 15 feet long and 40 inches wide; some cherry boards 20 feet long and 28 inches wide. A number of beautifully polished specimens of wood are also shown. Among other exhibits there is presented a piano made from a log of curled walnut, for which the president of the company paid $6500 in the rough in New York. We understand that the most valuable native woods sawed in this establishment are curled or burled walnut or cherry. Occasionally a fine log of this kind is encountered which costs as much as $1000. Various foreign woods are imported via New Orleans. The mills give employment to about 500 workmen.

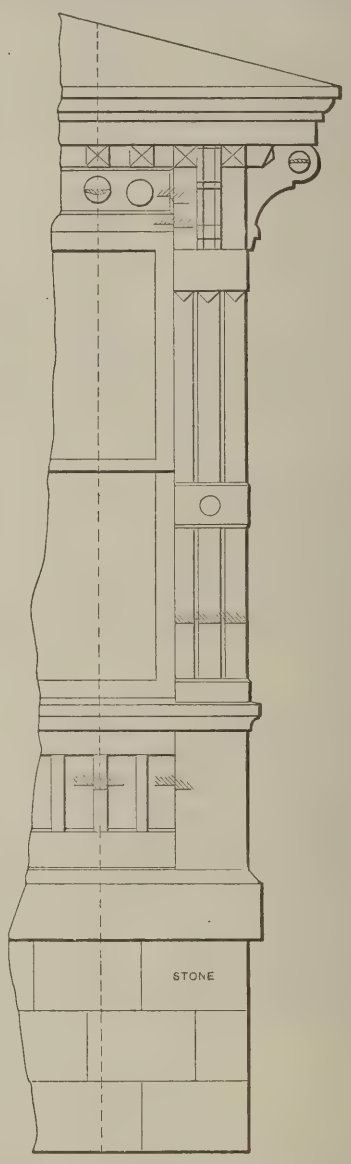


Details of House Designed by W. G. Mumma.—For Elevations, see Plate Pages.—Finish of Front Gable.—Scale, ⅜ Inch to the Foot.

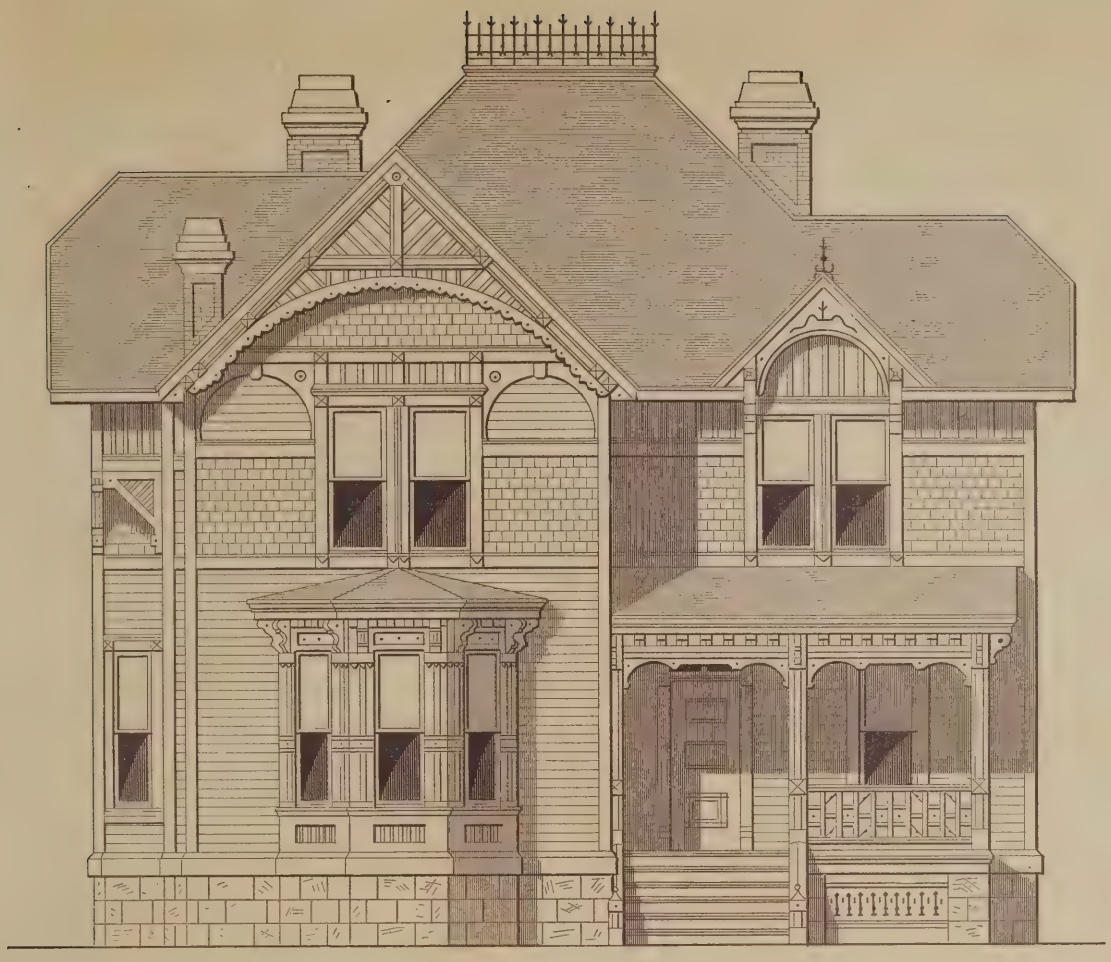


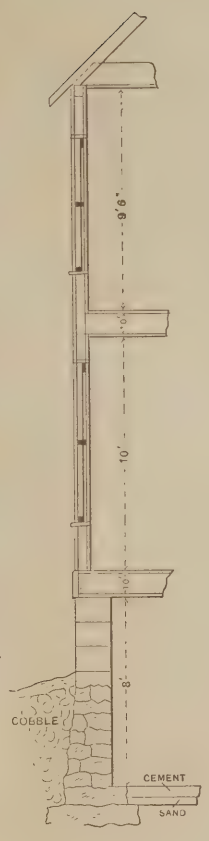
Gable Over Front Veranda.—Scale, ⅜ Inch to the Foot.

The careful experimentation that is sometimes made with reference to roofs and other features of building construction by old-country mechanics and engineers is happily illustrated by an occurrence in connection with the Berlin Market Buildings, Nos. 2 and 3, reported a short time since in one of our German exchanges. The zinc roofing over these buildings had been laid upon the brickwork without the employment of any intervening substance. It exhibited, after a short time, perforations and other signs of injury. These were more particularly apparent at the eaves, and only at the portions where the zinc had been in immediate contact with the brickwork. Careful analysis was undertaken. It proved that the brickwork contained soluble salts to the extent of 1.14 per cent. This proportion, it was shown, was sufficient to cause the injury which had been noticed. The destructive process had been hastened in its operation by damp from the brickwork, which had not completely dried. The use of a layer of building paper or similar material between the zinc and brickwork was recommended, as the result of the investigation. If something of this kind had occurred in America instead of an analysis being undertaken the result would very probably have been a wholesale denunciation of the roofing material as being of no account, and something to be avoided unconditionally.



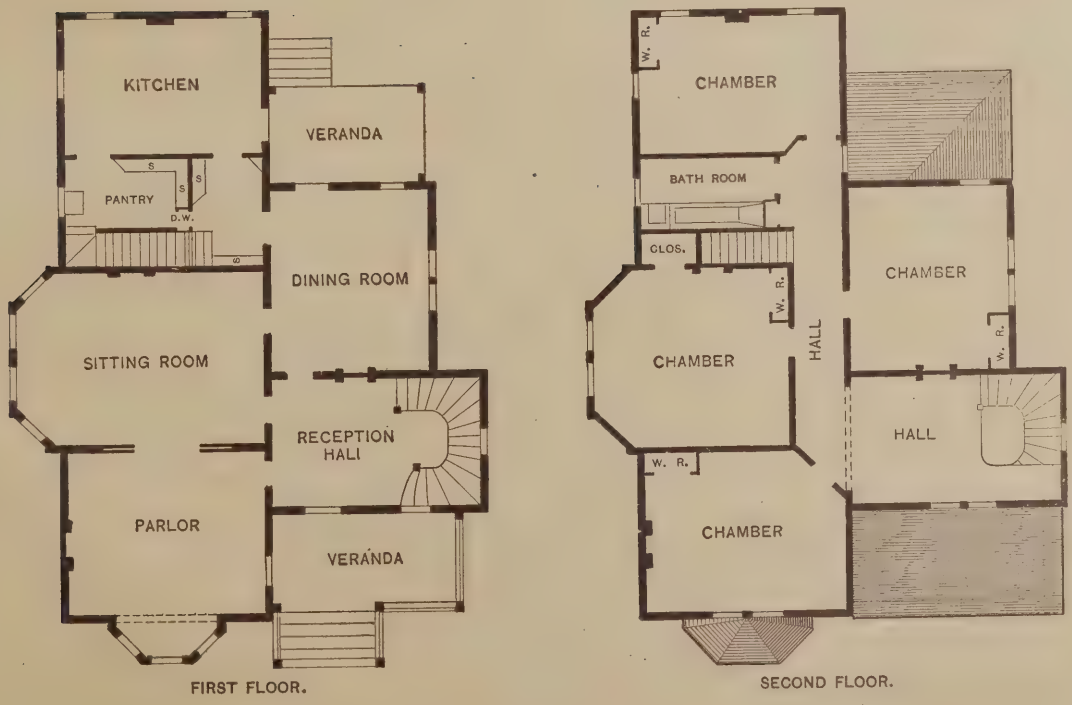
Details of Bay Window.—Scale, ⅜ Inch to the Foot.





Front Elevation of House, Designed by W. G. Mumma, Warrensburg, Mo.

Scale 1-8 Inch to the Foot.

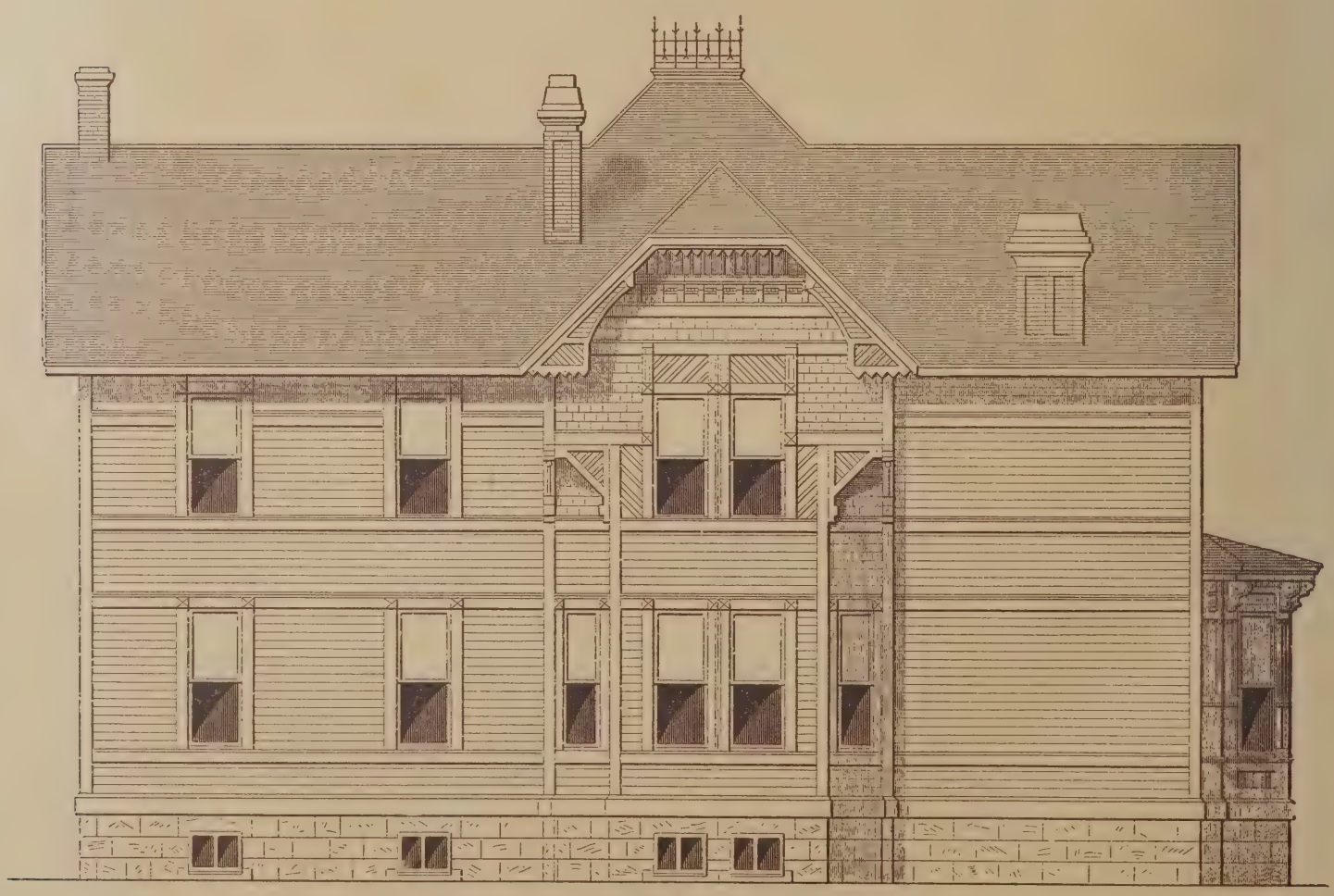


Floor Plans of House, Designed by W. G. Mumma.

Scale 1-16 Inch to the Foot.

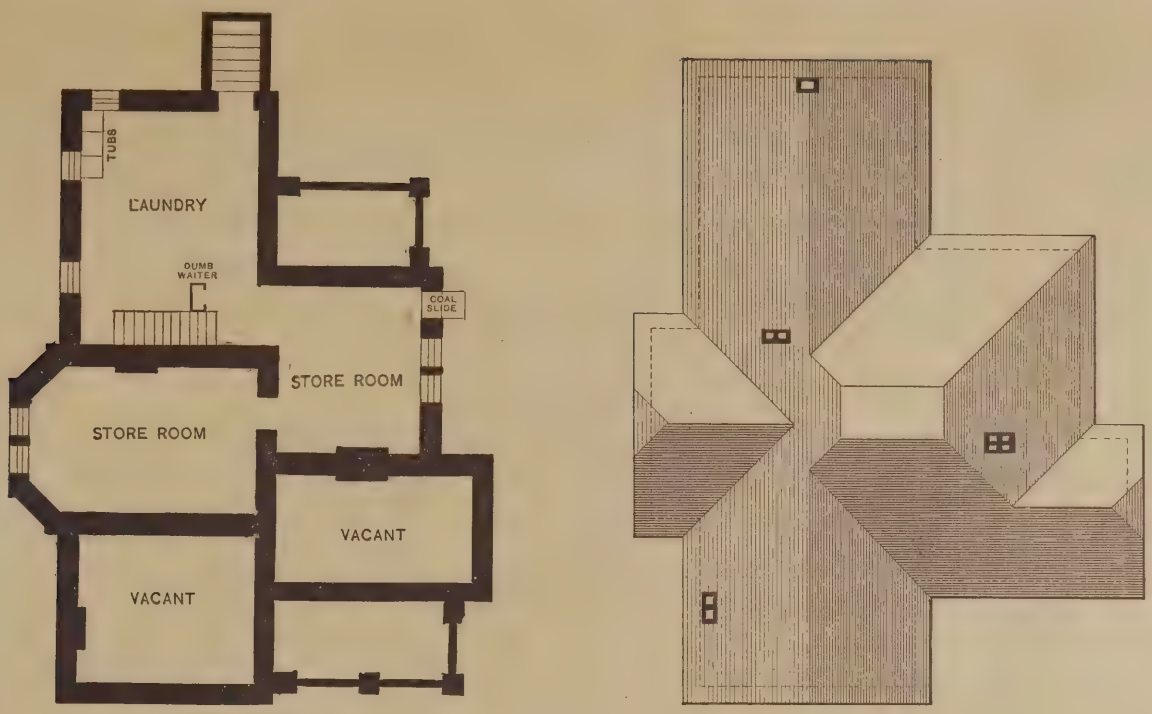
RIGHT SIDE ELEVATION OF HOUSE, DESIGNED BY W. G. MUMMA.

Scale 1-8 Inch to the Foot.



LEFT SIDE ELEVATION OF HOUSE.

Scale 1-8 Inch to the Foot.



Foundation and Roof Plans of House, Designed by W. G. Mumma.

Scale 1-16 Inch to the Foot.

Rear Elevation of House.

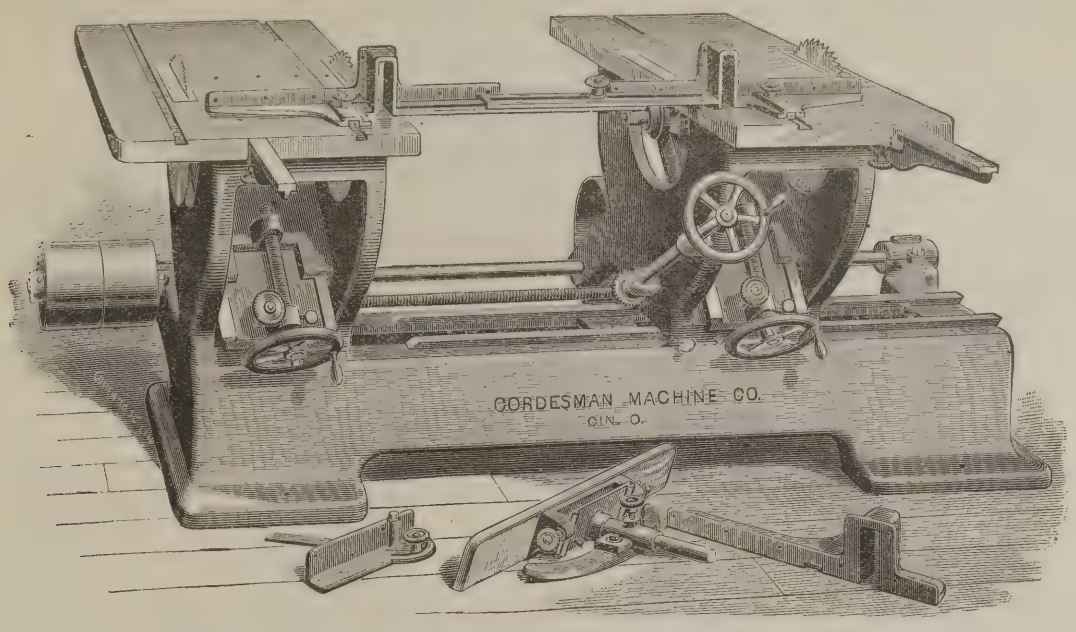
Scale 1-8 Inch to the Foot.

Design for Combined Desk and Bookcase.

NOVELTIES.

Double Cut-Off Saw.

The Cordesman Machine Company, Cincinnati, Ohio, have just ready for the market a double cut-off saw which embodies a number of improvements which have been suggested by the years of practical experience of this company in the construction of woodworking machinery. The device is designed to cut at both ends with accuracy in all kinds of material, and is adapted to work lengths varying from 4 inches up to 6½ feet. It is especially useful in furniture, box, piano, chbinet, sash, door, carriage and wagon factories. The base with the housings are cast in large heavy cored pieces. These have ample strength and rigidity for the purpose. The base, as will be noticed by the cut, Fig. 1, is wide, which secures a fair floor support. The left housing is bolted to a plain surface on the base, while the right can be readily adjusted to or from it by means of revolving gears on dove-tailed planed ways. This housing is provided with an adjustable gib and with set screws, so that in case of wear all lost motion can be readily taken up. It is also provided with thumbscrews, so that when adjusted it can be firmly held in position. The saw mandrels, the makers inform us, are of large diameter, made of the best refined machinery steel, revolving in long self-oiling bearings lined with the best babbit metal. Each mandrel carries two saws, and is so arranged as to be quickly raised or lowered on dovetailed planed ways by means of a hand-wheel and adjusting screw shown in the front of the machine. This enables the operator to have the saws extend through the table to suit any desired thickness of material to be cut. By this arrangement the table remains at a given hight at all times, and the inconvenience, labor, time and other troubles that follow where tables are adjusted to the thickness of material to be cut are avoided. The usual distance between the saws on their own mandrels is 18 inches. They may be spread to 20 inches; accordingly any length of material from 18 to 20 inches can be cut on either table. The mandrel boxes are adjustable, and in case the saws get out of line, by accident or otherwise, they can be adjusted to give the saws the proper lead. The swinging frame in which the arbor is mounted is provided with a belt tightener, by means of which the driving belts can be given the proper tension at all times. The tables measure 24 x 48 and 31 x 48 inches respectively. They are ribbed in such a manner as to prevent springing. The tables are securely bolted to the housings, and the openings through which the saws extend are made large enough to afford ample clearance for gaining, grooving and other similar cutters. When extra cutters or heads are used, the wood throat-piece is removed. Grooved ways are provided for the reception of various kinds of fences. The tables are likewise arranged so that extensions may be readily attached, and the operator enabled to cut very wide boards. The extension fences used upon this machine are new and thoroughly constructed. They are claimed by the manufacturers to be the only perfect fences of the kind used in this class of machinery. They are said to have the necessary rigidity and will not spring; yet, at the same time, they are so easily operated that they meet with general favor. The fences are made so as to pass entirely over the cutters and can be readily detached from the slides so that single or other forms of fences may be substituted.



Novelties.—Fig. 1.—Double Cut-Off Saw, Built by Cordesman Machine Co., Cincinnati.

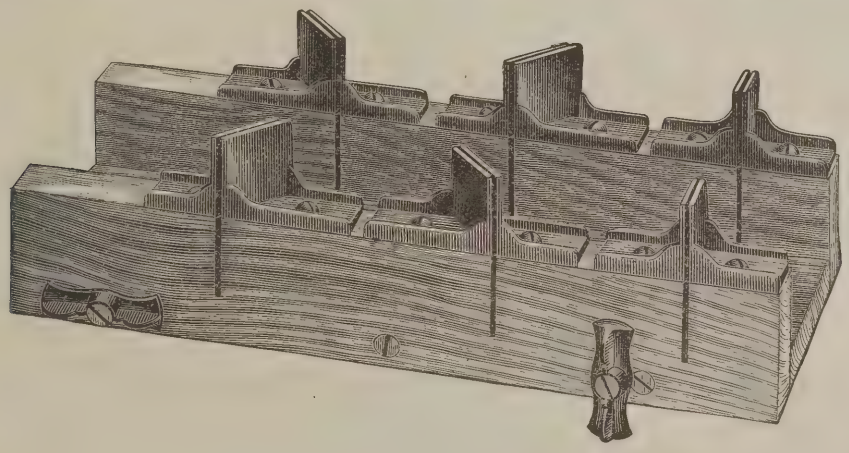


Fig. 2.—New Form of Olmsted's Miter Box.

Olmsted's Improved Miter Box.

Some time since we illustrated and described in this column a neat form of miter box put upon the market by L. H. Olmsted, of Corona, N. J. The article, among other features, recommended itself to users of tools of this kind on account of the simplicity of the construction, the thoroughness with which it was made, and its general adaptability to the usual line of work done by carpenters. Quite recently two new styles or additions to the assortment of miter boxes made by this manufacturer have been put upon the market and are illustrated in Figs. 2 and 3 of the engravings. The first of these is a wood bottom box with the usual irons to form a miter and to serve as a guide for the saw. In addition to these a separate pair of irons have been arranged at the right-hand end, to facilitate square cuts. The second engraving shows the same device

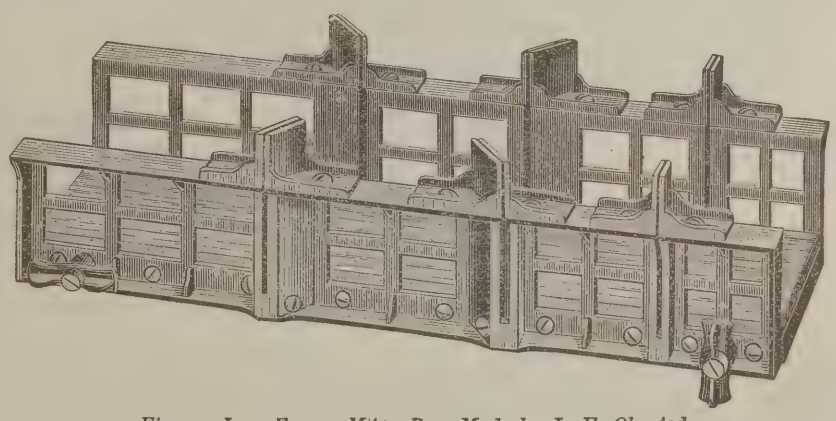
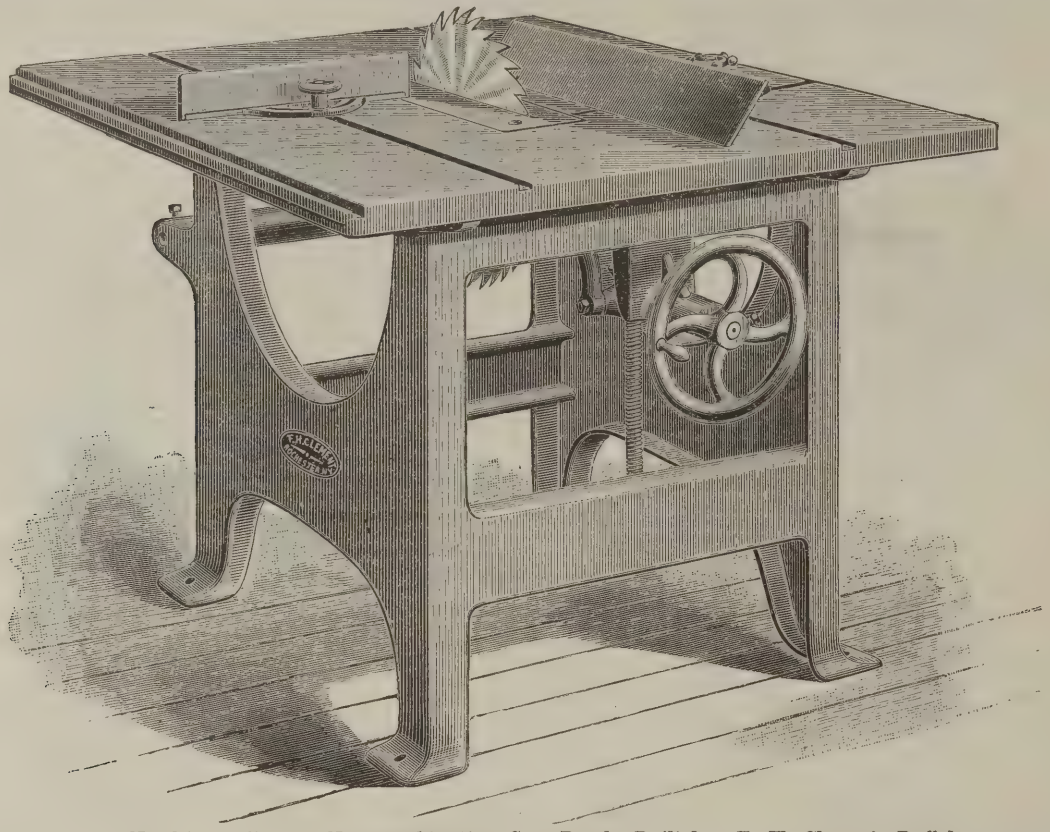


Fig. 3.—Iron Frame Miter Box, Made by L. H Olmsted.

made entirely of metal, with the exception of the wood base. It has guides for right and left cut and also for square cut. In each of the engravings will be noticed two buttons secured to the side of one of the uprights. These are used when turned vertically to form a stop or gauge, when the miter box is used on the edge of a table or bench. By turning the buttons horizontally the miter box can be screwed down to a bench. In the instructions furnished by the maker for the use of these miter boxes, we note that the saw should be put in with the teeth below the irons. Using the style of box shown in the first of the engravings referred to, this would bring the teeth only in contact with the wood. By reference to the second engraving it will be seen that below the special guides the space through which the saw passes has been enlarged so as to avoid any possible injury to the teeth of the saw. This miter box in its original form has obtained great popularity among readers of this journal, and the addition of the two styles here illustrated is calculated to add to its value. Referring to the second cut, the maker points out that when a back saw, with a blade 4 in. wide is used, the back serves as a stop by striking the top of the iron guide.

New Combination Saw Bench.

Fig. 4 of the engravings represents a new design of combination saw bench brought out by Frank H. Clement, No. 131 Mill street, Rochester, N. Y. The design embodies a number of valuable features. The frame is cast all in one piece and is so designed as to be strong and massive. The table is all iron with large surface, and is fitted for the attachment of gauges, of which three are furnished with the machine. One of these is described as a bevel slitting gauge, another as an adjustable cut off gauge, and the third a stationary cut-off gauge. The latter may be attached together for cross-cutting long work. The arbor yoke is adjustable vertically by means of the hand-wheel and screw shown in the cut, and is made very heavy and rigid in all its parts. There is a separate throat plate in the table to accommodate dado heads and other cutters. The opening is large enough to receive a 20-inch saw or a cutter-head several inches wide. The outer end of the arbor is fitted to receive a bit socket, and a boring table attachment is furnished when ordered, provided with all necessary adjustments and conveniences. All the fittings of the machine are first-class.



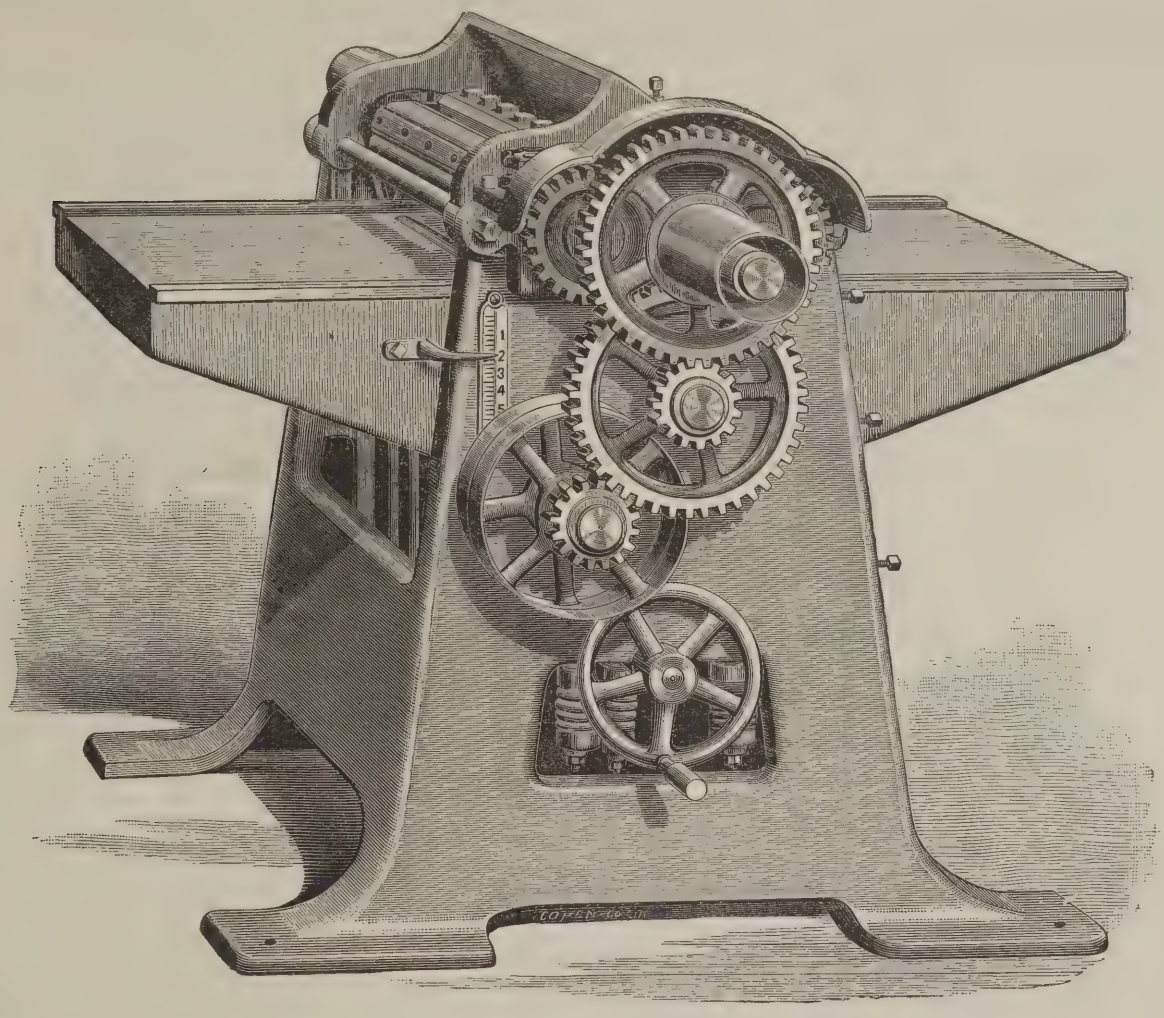
Novelties.—Fig. 4.—New Combination Saw Bench, Built by F. H. Clement, Buffalo.

The Brown Shutter worker.

In Fig. 5 of the engravings we show the lower portion of a window, with outside blinds operated by a shutter worker that is being put upon the market by the Ireland Mfg. Company, of Cincinnati, Ohio. It is known to the trade as the Brown Shutter Worker. The shutter is operated by means of a crank extending into the room. This is suitably held in place by means of a flanged piece which screws to the casing of the window. Any position that is required of the shutter is maintained by means of a set-screw passing through the side of this flanged piece, and engaging with the shaft to which the crank is attached. Outside of the window the shaft referred to passes through a special flange or bracket fastened on the lower hinge of the shutter. The outer end of the shaft is provided with a worm which engages with pins projecting downwardly on the flange of the portion of the hinge attached to the shutter. By this arrangement of parts a movement is secured for the shutter from wide open to the merest crevice, with the opportunity to fasten it at any intermediate point. The parts are simple and so constructed as to render the device efficient. It is of a nature to be easily applied to either old or new work, as

Fig. 5.—The Brown Shutter Worker.

circumstances may demand. We understand that a modification of the device is manufactured, in which a different crank is employed than what is shown in the engraving. The crank is made to fold back over the end of the shaft in such a way as to form an ornamental fixture in the room, and, at the same time, to lock the shutter in the way that it may be desired to have it remain. The locking is accomplished by the folding handle, and in this way takes the place of the set screw in the side of the shaft above described. Referring to the engraving, the company inform us that they have changed the position of the flanges on the parts of this device, so that they can be secured to the inside casing and the back edge of the shutter frame, instead of being both fastened to the outside, as indicated in the engraving. This conduces to the security of the window, making it impossible to gain access by removing the fixtures, in case the blinds were carelessly left unlocked. With the change of flange above referred to it is impossible to get out the screws, except when the shutter is thrown open.



Novelties.—Fig. 6 —Double Belted Planer, Built by Cordesman, Meyer & Co., Cincinnati.

Double-Belted Planer.

Cordesman, Meyer & Co., Nos. 186 to 188 West Second street, Cincinnati, Ohio, have ready for the market a 24¼ inch double-belted planer, the general design of which is indicated by Fig. 6 of the engravings. They put it forth as being a carefully constructed machine, and one which they can guarantee to do first-class work. The capacity of the machine, as already indicated, is 24¼ inches in width. It is adapted to any thickness up to 6 inches. The frame, as will be gained from the cut, is cast in one piece. It is made very wide at the bottom, and is gradually narrowed toward the top. The table is also cast in a single piece, and is dovetailed into the frame. The bearings are long, and are as far apart as the width of the frame will allow ; accordingly, the table is said to be as steady as if it and the frame were of a single piece. Wear is taken up by the side screws shown on the side of the frame. For planing different thicknesses the entire table is raised or lowered by the hand-wheel shown near the center of the cut. The indicator, also in the engraving, shows accurately to what thickness it has been set to plane. The cylinder head and journals of the same are made from a single piece of forged steel. The journals have very long bearings lined with the best babbit metal. A self-adjusting pressure bar is placed each side of and close to the cylinder with the effect of holding the material that is being planed very steady, even when the pieces are short or thin. The feed is described as being very strong and reliable. The rolls are large and the upper front one is fluted. Strong pressure is secured by double coiled steel springs. The gearing is so arranged that the rolls cannot lift out of gear. The adjustable-friction rolls in the table are the same size as the upper rolls, making the bearings on the rolls above and below the same.

New Leveling Instrument.

A new leveling instrument, made by C. F. Richardson, Athol, Mass., is illustrated in Fig. 7. It consists of a tripod, to the head of which is connected an upper plate, carrying a graduated arc and a level with telescopic sights. The tripod is of iron and has improved extension legs, by means of

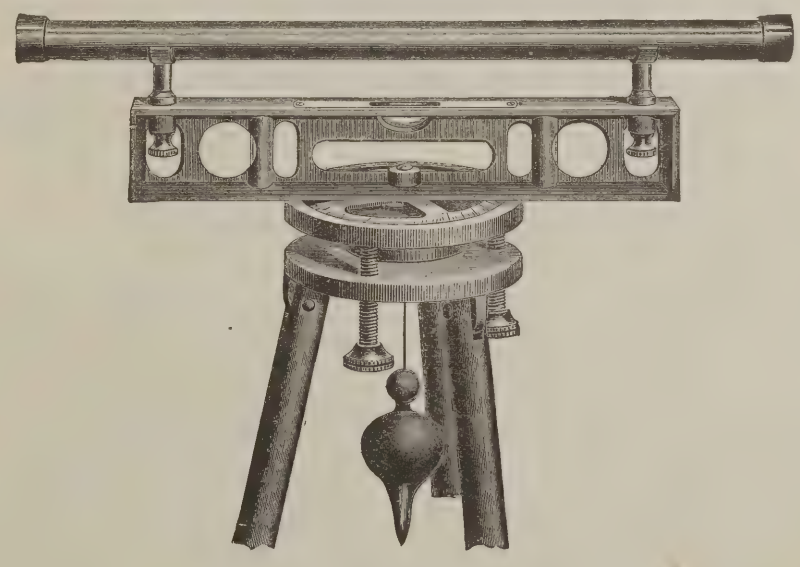
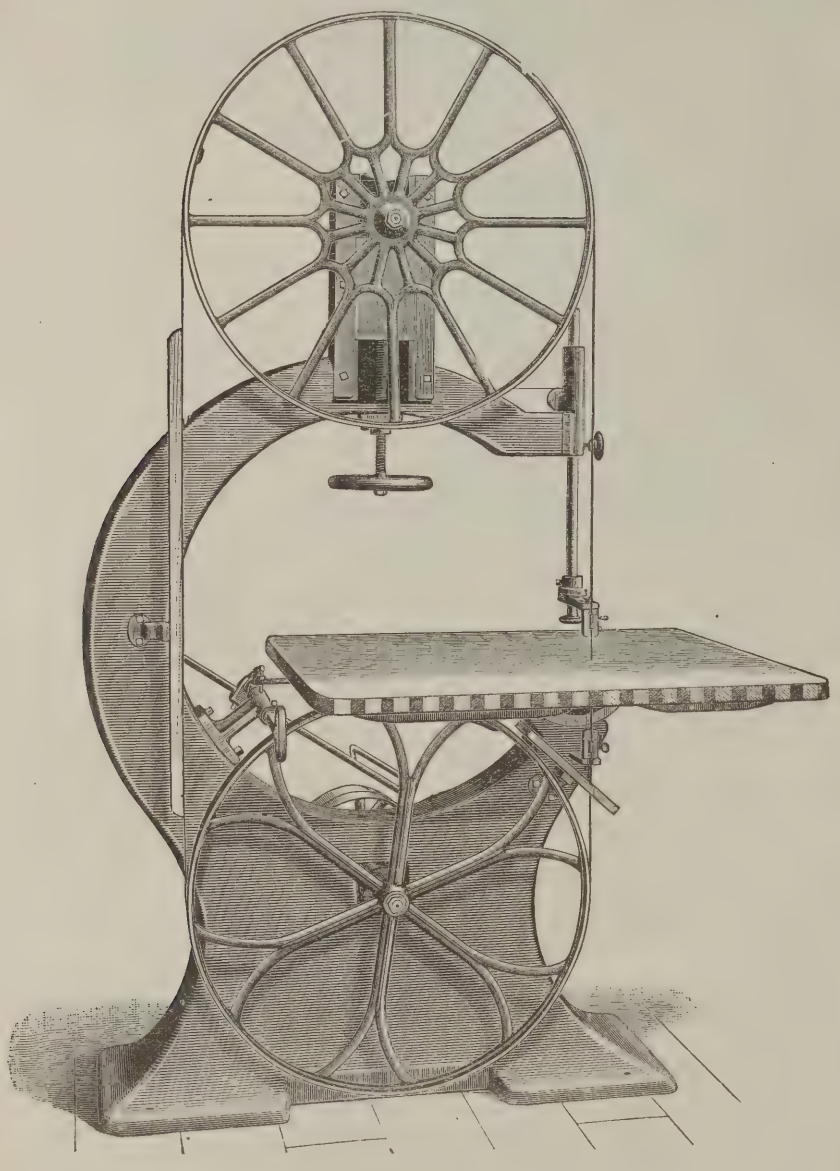


Fig. 7 —New Leveling Instrument.

which, if the location be very rough or uneven, the head may be brought nearly level by adjusting the lower parts of the legs and clamping them firmly. The upper plate is connected to the tripod head by a ball-and-socket joint, and can be leveled by the leveling screws. This plate is recessed to contain a graduated arc below its upper surface, and has a center stud on which the arc and level turn. The graduated arc is of steel, and has on it one-half of a circumference divided to degrees and properly numbered. This arc turns on the center stud of the upper plate independent of the level or telescopic sights. A 9 inch iron level with double plumb swings on the same stud as the arc, and can be taken off and used as an ordinary level or plumb. The telescope sight is a brass tube 12 inches long, supported above the level by standards, and in one end is a small eye aperture, while the other end has the usual cross-wires. In use the center of the instrument is brought over any desirable point by means of a plumb bob suspended from the loop beneath the tripod head. In uneven places an approximate level is obtained by means of the adjustment of the extension legs. The level is then brought over any one of the leveling screws, which are turned in or out until the bubble is brought to the center of the glass. The level is then turned 90 degrees, when the bubble is in the same way brought to the center of the glass, and this operation is continued until the bubble is in the center, in whatever direction the level may be turned. When this is accomplished the level is ready for use. This instrument is designed for architects, carpenters and contractors to lay out building sites and to determine the levels; for masons and millwrights, in the construction of foundations, and the setting of water-wheels. It is also designed for farmers' use for ascertaining the amount of fall for drains or the hight of springs, and it is also intimated that when the bearing of lines is not required the surveyor will find this in some cases superior to the ordinary needle compass. Its lightness, simplicity of construction and very moderate price, combined with the wide range of work to which it can be applied, are points to which special attention is called by the manufacturers.

New Band-Saw.

C. B. Rogers & Co., of Norwich, Conn., with New York warerooms at 109 Liberty street., announce a new band-saw, a general view of which is presented in Fig. 8



Novelties.—Fig. 8 —New Band Saw, Built by C. B. Rogers & Co., Norwich, Conn.

of the engravings. This is a machine made from entirely new patterns, and has, among others, the following distinctive features: The table is arranged to tilt for bevel work. The wheels are of iron, with double flanges, and are provided with rubber tire. There is a shifter attached to the frame, and the guide bar has a counterbalance inside of the frame, not visible in the engraving. The machine has recently been put upon the market, and is claimed by the manufacturers to be, without exception, the best machine available at the present time. The wheels are 36 inches in diameter and are of the best construction in every particular. The frame or column is cast in one piece and is sufficiently stiff to guarantee perfect alignment of all parts. The machine is designed for all ordinary kinds of work. The wheels are in self-oiling boxes hung on pivots, and by means of hand-screws are easily tilted to change the track of the saw blade. The tension of the saw is regulated by the upper wheel, which is hung in a gibbed frame and is quickly adjusted by means of the hand-wheel. The guides are of improved design, and the upper one adjusts to 13 inches above the table. The table is of wood glued up in narrow strips to prevent warping. The weight of the machine is in the neighborhood of 1600 pounds.

Combined Saw-Bolt and Grease-Cup.

A decided novelty that is of interest to all users of saws is being introduced by W. R. Towse, of No. 147 John street, Cincinnati, Ohio. It is described as a combination saw-bolt and grease cup. The general features of the article are shown in Fig. 9 of the

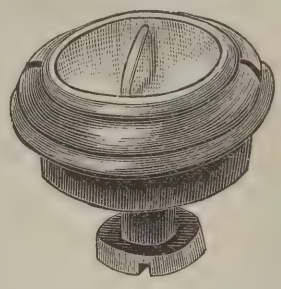


Fig. 9 —Towse's Combined Saw-Bolt and Grease Cup.

engravings. It is a simple device for having at hand at all times the lubricant necessary for use with sticky saws when working with wet or spongy lumber. Referring to the engraving, it will be seen that one side of the bolt consists of a hollow receptacle into which is inserted a cup-shaped cap. To the inner side of the latter there is secured by means of a spring ring a piece of felt cut to the form of a circular disk, or a piece of sponge may be substituted. Whichever is employed it is thoroughly saturated with oil or grease, and is at hand for instant use when needed. On the inside and near the top of the cup there is provided a groove with two notches cut therein. Into these two small wire lugs attached to the cap are passed when inserting the cap, then by a quarter turn the cap is locked in place. By reversing the motion the lugs are brought opposite the notches, so as to permit the cap to be withdrawn. To facilitate withdrawing the cap a small wire rod extends across the top in such a way as to be conveniently grasped by the thumb and finger. The device may be very readily attached to old saws as well as to new saws by simply removing the old bolt and boring a hole through the wood sufficiently large to admit the body of the cup, and then securing the nut which is supplied with the cup upon the opposite side.

Window Ventilator.

The illustration shown in Fig. 10 presents a general view of a window ventilator patented and manufactured by T. Theodore

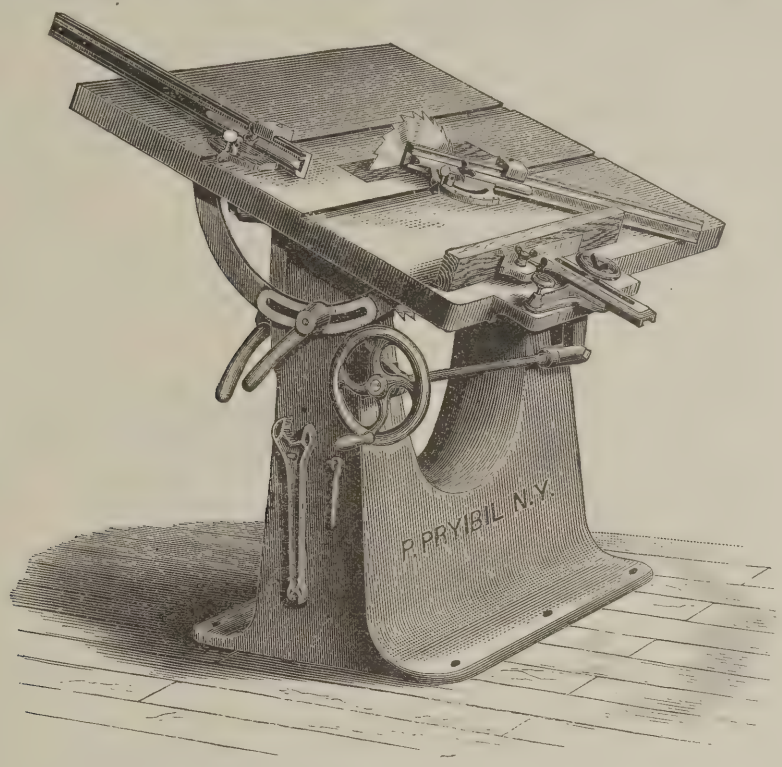
Fig 10.—Window Ventilator.

Cohen, 211 South Thirteenth street, Philadelphia, Pa. The ventilator is spoken of as being adapted to stores or bulk windows, stationary or double-hung windows, transoms or doors. It is said to prevent windows

from sweating and freezing, and allows fresh-air ventilation without causing draft or inconvenience to the occupants of the premises. By means of the attachment shown at the side the ventilator can be opened or shut at will.

Bevel Circular Saw Table.

The machine shown in Fig. 11, brought out by P. Pryibil, of Fortieth street and Tenth avenue, New York, is designed for sawing all kinds of simple and compound bevels, and is of special value where moldings are to be fitted around surfaces that are out of square—as, for instance, tapered posts or coffins. The machine is described by the manufacturer as being built very solidly, the body being a hollow casting in a single piece. The saw arbor is carried in self-oiling bearings on a swinging frame provided with a raising screw for adjusting the head of the saw and with a clamping screw for holding it firmly in position, being at once a simple, accurate and rigid construction. It is free from the the lost motion which is inseparable from slides when set loose enough to be operated with reasonable ease. The table is of iron, and may be set at any angle from square up to 45°. The saw through all movements of arbor frame and table remains in the same position in the saw slot. A wooden throat piece gives access to the arbor and provides for the use of a wabble saw, or cross saw, and prevents injury to the teeth. An adjustable rip-gauge and cross-cut slides, with adjustable miter fences, are fitted to the table. The miter fences are so constructed as to keep close to the saw, no matter what the angle may be at which they are set. They are provided with length-gauges and with means for attaching wooden extensions for extra long work. To render the machine free from vibration and to avoid the disadvantages incidental to the use of short belts, such as excessive strains upon the bearings and difficulty of keeping the belt at proper tension, the counter-shaft s made separate from theimachine.



Novelties.—Fig. 11.—Bevel Circular Saw Table, Built by P. Pyribil, New York.

The Victor Sash-Lock.

A very simple and yet effective device for locking window sashes is being put upon the market by the Ireland Mfg. Company, of Cincinnati, Ohio, one design of which is illustrated by Fig 12 of the engravings. The lock is manufactured in several different styles. In its simplest form it more nearly resembles in appearance the ordinary sash-lock than many of the devices of the kind which have been illustrated in the past. It differs from the common sash-lock, however, in several important particulars, prominent among which may be mentioned the fact that there is no possible chance of operating the device from the outer end of the lever; accordingly, there is no danger of forcing the window by picking the lock by some such means as passing a thin blade between the two sashes. The operating lever or handle, which projects into the room, is a separate piece of metal from the lock at the opposite end. It fits into a slotted recess formed in the latter in such a way as to make the two parts work together as though one piece, and yet allow the handle or lever to operate independently of the lock in certain respects. On the lower flange which screws to the top of the sash there are provided two studs, and also what may be described as a circular-inclined plane. Assuming that the sash lock is in the position of being unfastened, and it is desired to close it, the act of turning the lever so as to force the lock around causes the front piece already referred to as being detached from the lock, to rise by passing over the inclined plane in the course of the revolution. As it gets to the right point it drops down between the end of the circular-inclined plane and one of the studs already referred to. It is forced into this position by means of a spiral spring which is placed around the pivot about which it revolves. In order to unlock the sash it is necessary to slightly raise the lever before turning it. The action is easy and the movement positive.

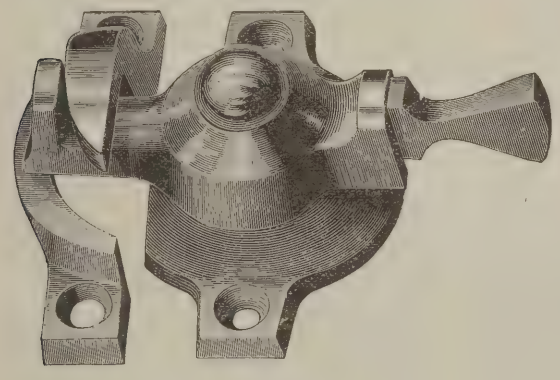


Fig. 12.—Victor Sash Lock.

Redstock's Patent Door Knob.

This article, of which the Gaynor & Mitchell Mfg. Co., Bridgeport, Conn., are sole manufacturers, is illustrated in the accompanying cuts, Figs. 13, 14 and 15. Fig. 13 represents the finished bronze knob and

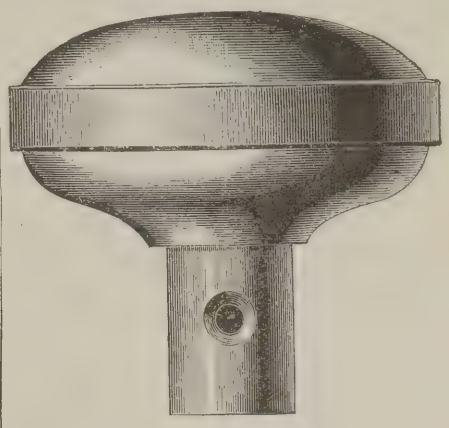


Fig. 13—Gaynor & Mitchell Mfg. Co.'s Patent Door Knob.

Figs. 14 and 15 show its construction. The exterior of these knobs is bronze, and the interior iron and other cheap material, which furnish the requisite solidity and strength. It will be perceived that Figs. 14 and 15 fit together, leaving a slight projection of bronze

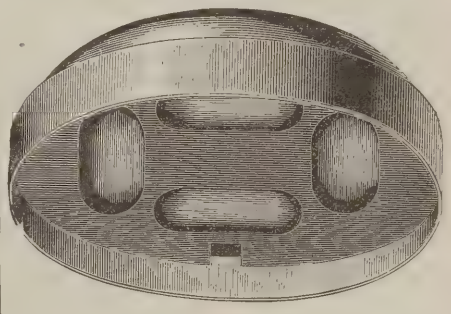


Fig. 14.—Interior View of Cap of Knob.

in the part designated as Fig. 14, which when turned down over the coresponding portion of knob, as shown in Fig. 15, gives the knob as represented in Fig. 13. The operation of thus connecting the knobs is so neatly performed as to make the junction invisible and to

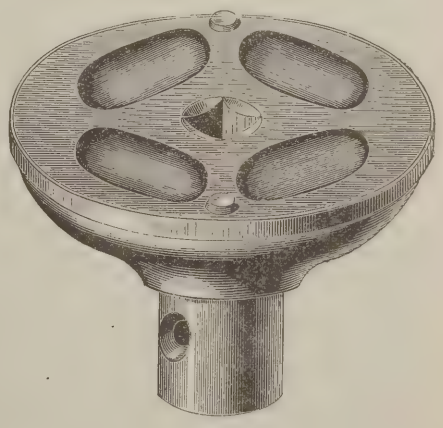


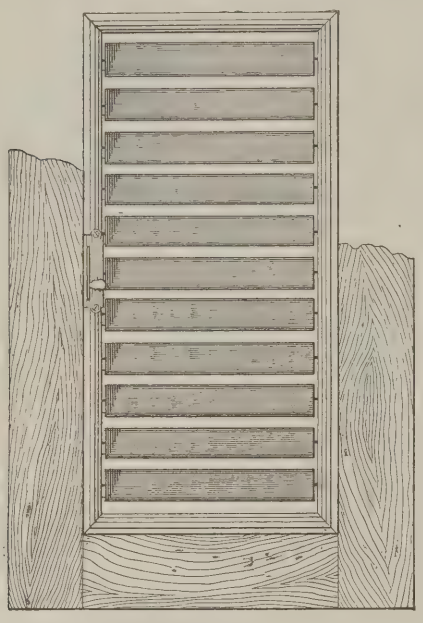
Fig. 15.—View of Body of Knob.

give the knob all the appearance of a solid bronze knob. The manufacturers refer to this knob as retaining all the good points of the solid bronze knob, being as strong, durable, handsome, &c., while unnecessary waste of material is avoided, cheap material

being substituted where cheap serves the purpose as well as expensive. In the old way a solid knob was made having a bronze exterior and interior, while in these a solid knob is also furnished, having a bronze shell exterior, and iron and other cheap materials for its interior. Of these knobs different sizes and patterns are made, and emphasis is laid on the substantial merit of the goods, and the low prices at which they can be offered.

New Window Blind.

A new construction of the slats of window blinds which is likely to be of interest to



Novelties.—Fig. 16.—General View of Morstatt's Improved Acme Blind.

architects and builders generally, as well as householders who are favorably disposed toward neat and well constructed devices, is being introduced by Morstatt & Son, Nos.

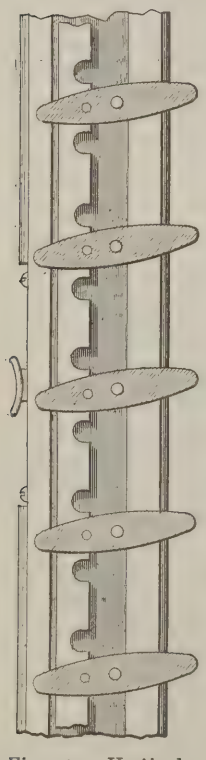


Fig. 17.—Vertical Section, Interior, Showing Slot Connections.

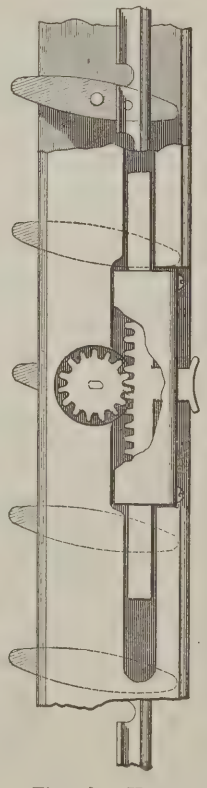


Fig. 18.—Vertical Section, Exterior, Showing Movement.

227 to 229 West Twenty-ninth street, New York. The general features of the device are illustrated in Figs. 16 to 19 of the accompanying engravings. The invention which is the gist of this improvement relates to means of operating the slats of blinds. What is here shown is esssentially the outcome of a series of improvements which the same

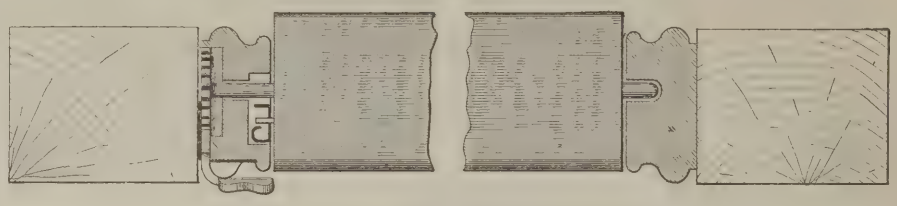


Fig. 19.—Horizontal Section through Stile and Panel.

manufacturers have made. The present construction has compactness, neatness and efficiency to recommend it over what has preceded. It has already been favorably noticed by a number of architects to whom it has been practically exhibited. The slats are controlled at their ends, thus doing away with the unsightly stick which formerly defaced the front edges of the slats. The works are concealed, and nothing is visible but a simple plated lever, which is readily moved by the finger. The movement, as clearly shown in the detail engraving, is that of a ratchet and pinion. The pinion is upon the axis of what may be termed the "master-slat" of the series, while the slats are connected with each other by means of a metal strip set in a groove inside of the panel margin. They are attached by pins. These pins are put in place in the ends of the slats by ingenious automatic machinery, in a way to insure absolute accuracy and the lowest possible cost of manufacture. The construction is so clearly shown in the engraving that further description is scarcely necessary. A novelty connected with this improvement is the manner in which the article is being put upon the market. Recognizing the fact that Western manufacturers can produce the framework of blinds quite as cheaply as they can be made in New York, and also remembering that the transportation charges on work of this kind is a large item, Morstatt & Son, have arranged to put the panels with the slats fitted and adjusted therein upon the market, leaving to carpenters, builders, sash, door and blind factories, &c., the work of making the frames to suit. To this end the panels are shaped, as shown in the engraving, and arranged to be fitted in place by slightly planing from their sides and ends as may be necessary. Samples of this article which have been submitted for our inspection are models of neatness and thorough construction, and the scheme of putting goods upon the market as above described is certainly one that is of interest to our readers.

Square Corrugated Pipe.

Knisely & Miller, of Chicago, have just ready for the market square corrugated pipe made in the same manner as their round corrugated pipe, which has been before the trade for some months past. In Fig. 20 is a sectional view of the pipe. The pipe is much handsomer in appearance than the ordinary square corrugated article which has been largely employed in the past. While retaining all the advantages of corrugation, there has been some taste displayed by the designer in the matter of combination of curves and angles, resulting in a very pleasing design. Where the greatest strain would come in the pipe from ice, for example, at the corners, a long curve is presented, and midway between the corners a molding is introduced, giving the pipe what may be termed an architectural finish

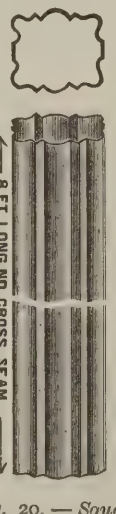


Fig. 20. — Square Corrugated Pipe.

The groove is made midway of one of the sides. This pipe, like the round pipe of the same manufacturers, is made in 8-foot lengths without a cross seam. It is manufactured in different sizes, and both galvanized and of copper.

Tolman's Roofing Bracket.

A new roofing bracket is shown in Figs. 21 and 22 of the engravings. It is being introduced by Snow & Van Vleck, manufacturers' agents, No. 90 Chambers street, New York. The article has had over a

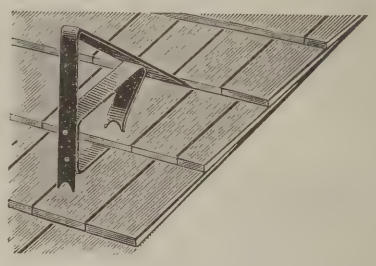


Fig. 21.—Tolman's Roof Staging Bracket.

year's practical test upon the part of different roofers and builders, and is now confidently offered to the public as being serviceable in all respects and reliable. It is very simple in construction, and consists of two pieces of heavy band iron bent into the form shown in the first engraving. A projecting tongue extends from the upper member, and, when the bracket is in position,

Fig. 22.—Staging Bracket Inverted.

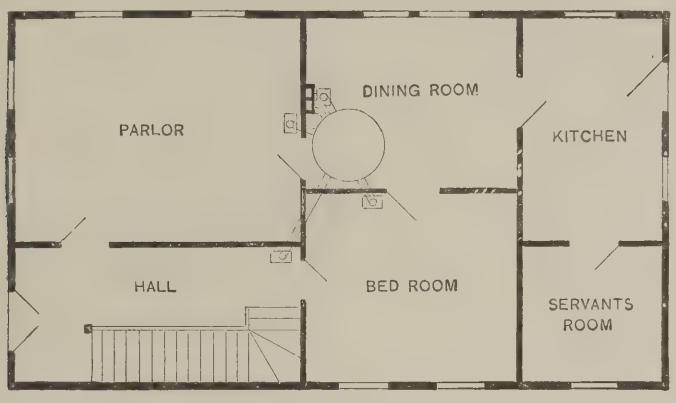
goes under the course of shingles next to the staging board. A somewhat longer projecting tongue extends from the back brace and slips under the next course of shingles below. The lower end of the back brace is made in the form of a double-pointed foot and engages with the shingles, as shown in the second engraving. A downwardly projecting spur from the interior brace similarly engages with the next course of shingles above. Projecting studs are also provided in the upper member of the bracket, which keep the staging board from slipping. Among the advantages to which the makers direct attention we note that the bracket stands bracing, instead of hanging to the shingle ends. It is self-adjusting, and the double support prevents liability to break or slip. It is simple, light and safe. The construction is such that it may be safely thrown to the ground from the roof of a building. The statement is made that one dozen per minute can be placed in position. The price is so low that a liberal number can be afforded upon the buildings upon which they are to be used.

It is reported that over 14,000 squares of roofing slate, making 269 carloads, were shipped from the Bangor region during the month of September.

CORRESPONDENCE.

Setting Hot-Air Furnaces.

From J. C. HENDERSON, *Troy, N. Y.*—In reading the last issue of *Carpentry and Building*, I was struck by the cuts and description of the way to set hot-air furnaces in dwellings, contributed by your correspondent "C. T." Fearing that what he has said may mislead some inexperienced person, I think it should be corrected without delay. To heat a building it is important to deliver the heat from the air heating furnace into the several rooms, at the nearest point possible to the furnace.



Setting Hot Air-Furnaces.—Fig. 1.—*Sketch Submitted by J. C. Henderson.*

This has the effect of avoiding long horizontal pipes in the cellar, which not only heat the cellar, but have the effect to retard the flow into the rooms; at the same time, construction of this kind has the disadvantage of costing more than is necessary. A furnace should be located in the most central position for all the rooms to be heated; for the quicker the heat flows into the rooms, the less friction and condensation occurs, and the better the results obtained. The higher temperature of the air reaching the rooms through the furnace pipes is the only thing that causes circulation. To show how much easier and cheaper a furnace can be set than described by your correspondent, I have copied his plans showing the correct way to set the heater, and also indicating the better location for the registers. In Fig. 1 your correspondent shows the places for the pipes to the second story. This I have changed, and have indicated how the pipes ought to run. One runs through the partition and the other uses the vacant brick flue. This one pipe will heat all the rooms above. If the flue thus utilized for hot-air duct should be needed for ventilation or other purposes, the partition pipe could be located between the dining-room and parlor, or, better still, if the chimney is not built, provide a third flue for the hot air to run in in order to reach the second story rooms. In Fig. 2 your correspondent does not show any second story pipes, so I correct his plan simply to the extent of showing the location of furnace pipes and registers in a more compact form. The plan that I have shown will cost much less, and, in addition, will heat the house far better. All builders and those setting furnaces should conform to the idea of short pipes and a central position for the furnace in order to have the furnace heat and circulate the air properly to the several rooms.

Your correspondent is wrong also with his cold-air supply. The air should be conducted, where possible, under the cellar bottom, and the square inches should be not less than three-quarter the capacity in inches of all the hot-air pipes that leave the heater, and in all cases the air should be taken from outside the building; north or west is best. The mouth of the cold duct—that is, the window, should be still larger, so that the wire screen which is employed there will not contract the quantity of air furnished; in no case connect the tube from the hall or rooms to the cold-air box. The pressure from the outside is so much greater than that from the partially heated inside as to cause the air from the outside to flow directly into the rooms through such a duct. In many instances, to prevent the flow into rooms in this way furnace setters cut off the outside box. If the box inside has not sufficient capacity to fill the hot-air pipes, it will be the cause of trouble. What is needed is the outside pressure to drive the hot air into the rooms and drive out of the rooms the same quantity of air through the chimney or cracks about doors or windows, as the case may be. Two measures or quantities of air cannot remain in one room at the same time. There is always necessary the outside pressure above referred to, to maintain circulation. Your correspondent's list of hot-air pipes may do for a city house, but they are not large enough for country houses which are exposed on all sides, and usually less warmly built.

Note.—It gives us pleasure to publish the above communication from an old furnace manufacturer, and one whose experience in matters of this kind entitles him to more than ordinary consideration. It should be remarked, however, in justice to our correspondent, whose efforts are being criticised, that he indicated a wider distribution of registers than is shown in the new engravings which we present herewith. Evidently

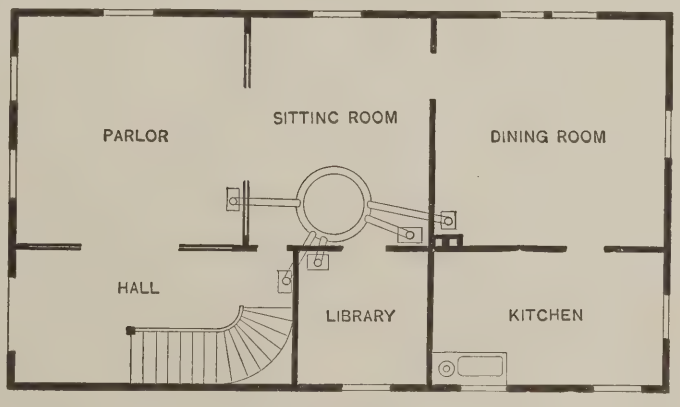


Fig. 2 of Mr. Henderson's Sketches.

the intention of "C. T." was to get the distribution of the hot air as near the outside walls of the building as possible, while in the alternative plan here presented the idea is to have the source of heat central. Irrespective of the merits of the theory upon which this depends, we have no hesitation in saying that for ourselves we much prefer being in a room where the heat is near the outside walls than where it is found near the center of the building. In locating steam or hot water radiators, for example, it is a poor plan to put them near the center walls of a room, rather than against the exterior walls, simply because a little less piping is required to connect them with the heater in the lower part of the house. With furnaces, however, other considerations enter into the problem. We allude to these facts simply in the sense of provoking discussion. We shall be glad to have further correspondence upon this subject, for it is one of great interest to the trade at large.

Finding the Radius of an Arc.

From A. S. R., *Boston.*—I have got many useful ideas from *Carpentry and Building*, and I feel disposed to add my mite in the way of payment for the same. I have a method for finding the length of theradius of an arc, where the cord and rise are given, that may be of interest to my fellow carpenters. The rule is as follows: Square one-half the cord, divide this amount by the rise, add to the quotient the rise, and divide by 2. This will give the length of the radius. If any of the readers of *Carpentry and Building* have got a better way, I would be glad to know it, for I have got a large amount of such work to do.

Note.—We shall leave this question to our readers for answer and discussion in the spirit in which our contributor proposes it. In passing, however, we would remark that mechanical means, by which we mean simple construction, would seem to answer the purpose to better advantage than any calculation whatever, to say nothing of the method which our correspondent follows.

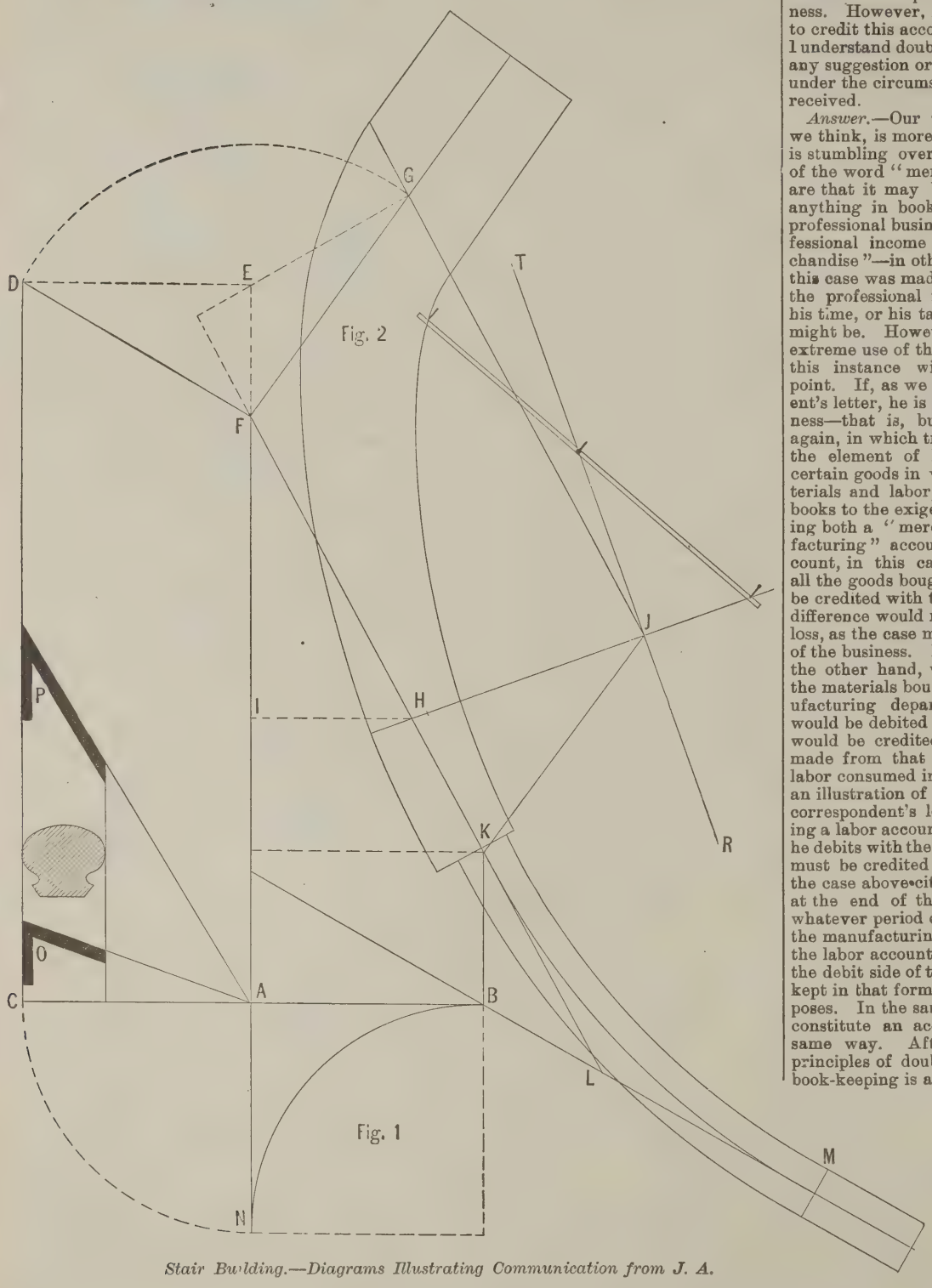
Cements.

From C., *Waterbury, Conn.*—Can you give me a recipe for a cement which will be of use in joining broken castings? Also a cement to join together broken fire-brick, or a combination which will make it?

Note.—The following recipe for a cement for joining castings may be of interest to our correspondent: Take equal parts of sulphur and white lead with about one-sixth of borax; incorporate them so as to form a homogeneous mass. When about to apply to the fractured part wet with strong sulphuric acid; place a thin layer of the cement between the two pieces of iron, which are then to be pressed together. In a short time, say three to five days, it will be perfectly dry and all traces of the cement will have vanished. The iron will have the appearance of having been welded together. This recipe was given some time since by a correspondent of the *English Mechanic.* We have not tried it, and simply publish it for what it may be worth. The following has been suggested as a cement for filling out the leaks in cast-iron vessels: 5 parts of sulphur, 2 parts of graphite and 2 of fine iron filings are melted together, taking care that the sulphur does not catch fire. The parts, previously warmed, are covered with the cement reduced to a pasty consistency over a fire and firmly pressed together. One authority says that glycerine and litharge stirred to a paste hardens rapidly and makes a tolerable cement for iron upon iron. With reference to our correspondent's last question, we do not know of any cement that is adapted for joining broken fire-brick. The combination which will make it, we suppose, refers to something that will take the place of fire-brick. We would refer him to the plastic material manufactured for this purpose by the H. W. Johns Mfg. Company, New York City.

A Stair Building Problem.

From J. A., *Utica, N. Y.*—I have seen *Carpentry and Building* occasionally, and have followed with much interest the different letters and articles relating to hand-railing. I have thought, perhaps, the inclosed would be of interest to some of your readers, especially to the learners among your subscribers. I became acquainted with the system when an apprentice in England. The problem in question is a method of getting out a rail for three or four winders in the quadrant. Referring to the sketch: pitch at the bottom gives the line I H, and from H to J gives the trammel line. To get the bevels, set the compasses at J to the line F G square across; then set one leg at A up the line C D gives the top bevel P; then set one leg at J to the line F K; then place one leg at A and cross the line C D, gives the bottom bevel; set the width of rail on the bevels, and what it measures on the bevels gives the width of face-mold at each end. To set the rod and pins, make H J equal to A B, which is the center of rail; set off half the width of rail on each side; then put your



Stair Building.—Diagrams Illustrating Communication from J. A.

Suppose Fig. 1 be the center of rail, open A N to A C, set up the hight of three or four winders, as the case may be, up the line C D; make D F and B M to your common pitches; then make the line F L, crossing the springing line at K, while K L is about 8 inches and L M the same gives the easing as shown; add 4 inches of straight at the bottom; then make a square line from F K, cutting the corner at E to G; then set the compasses at F and make the line D G, and where they cross gives the covering line; make G J parallel to K F and K J parallel to F G, gives the development; set the top first and second pins at J and inside edge opposite H; then bring your first pin to the inside opposite G, keeping the second pin on the line T R, and where the rod crosses the line H J gives the place for the third pin. Proceed in the same way for the convex side.

Question in Book-keeping.

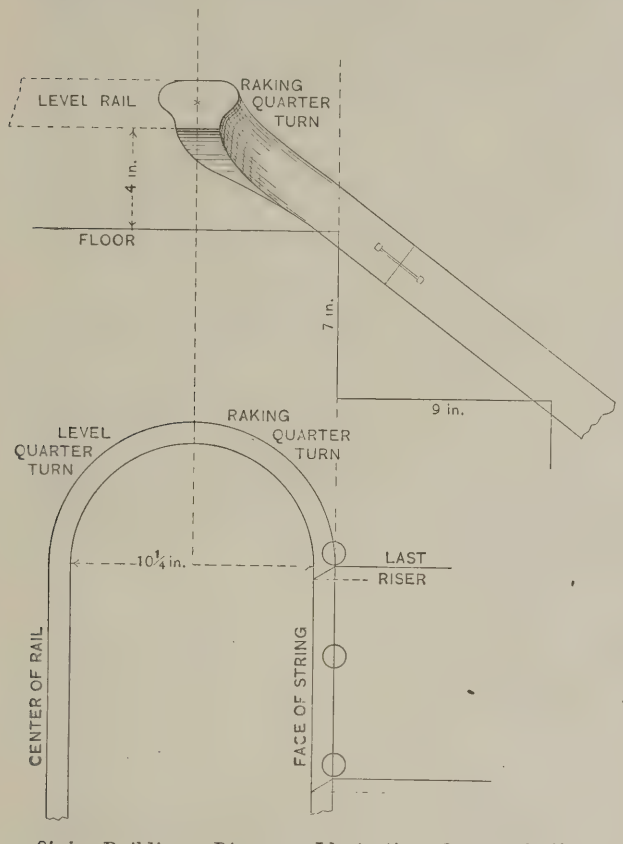
From J. D. B., *Columbus, Ga.*—I desire to propose a question in the book-keeping of plumbing establishments, upon which I would be glad to have the opinion of the Editor. Suppose a workman goes out on a job and uses, say, 10 inches of ¾-inch pipe, 1¾ inches bib, and that his labor amounts to 75 cents. I charge these items up to the customer. The question is, What shall I call the account to which I post the credit? The material used, I could, of course, call Mdse.; but how about the labor? I keep a labor account; but I want to use it only in the way of charging up my weekly pay roll. Another question: When I get in a bill of goods I make a journal entry like this: "Mdse. Dr. to N. Y. Supply Co., $50" Now this, it seems to me, is not right. Merchandise is a passive creditor in my business. However, I sometimes have occasion to credit this account for sundry small sales. I understand double-entry book-keeping, and any suggestion or advice that will help me under the circumstances will be thankfully received.

Answer.—Our correspondent's difficulty, we think, is more imaginary than real. He is stumbling over the literal interpretation of the word "merchandise," when the facts are that it may be made to mean almost anything in book-keeping. We have seen professional business recorded wherein professional income was derived from "merchandise"—in other words, merchandise in this case was made to represent that which the professional man had to sell—namely, his time, or his talent, or both, as the case might be. However, we do not advise such extreme use of the word merchandise; but this instance will serve to illustrate the point. If, as we infer from our correspondent's letter, he is conducting a mixed business—that is, buying some things to sell again, in which transaction there is none of the element of labor, and manufacturing certain goods in which there are both materials and labor, he can accommodate his books to the exigencies of the case by opening both a "merchandise" and a "manufacturing" account. The merchandise account, in this case, would be debited with all the goods bought to sell again. It would be credited with the goods so sold, and the difference would represent the profit or the loss, as the case might be, in that department of the business. Manufacturing account, on the other hand, would be debited with all the materials bought to be used in the manufacturing department, and, in addition, would be debited with the cost of labor. It would be credited with such sales as were made from that department, including the labor consumed in putting the goods in place, an illustration of one of which appears in our correspondent's letter. He mentions keeping a labor account. This, in all probability, he debits with the weekly pay roll. In turn it must be credited in order to close it; and in the case above cited it would be transferred at the end of the year, quarter, month or whatever period of time might be desired, to the manufacturing account. In other words, the labor account would be a subdivsion of the debit side of the manufacturing account, kept in that form simply for statistical purposes. In the same manner materials might constitute an account to be opened in the same way. After one has mastered the principles of double-entry, he will find that book-keeping is an elastic science that may be adapted to almost every exigency that arises. All that it is necessary to do is, first, to have a distinct outline in mind of what it is desired to accomplish. Then decide upon as many accounts as may be necessary to keep the statistics of the business in correct form, and see that entries from time to time are correctly made, and then correctly post them. We imagine that the majority of our readers would not have the trouble of mind about the entry cited by our correspondent, for the reasons he has named. The item of 75 cents, in all probability, does not represent the cost of the labor, but, rather, the price at which labor is sold, and they would argue that labor can be sold as well as goods; therefore, both goods and labor, as far as book-keeping is concerned, are merchandise. We trust these general remarks will help our correspondent, under the circumstances. If

we have not cleared his mind in all particulars, we shall be glad to hear from him further.

Location of Stair Balusters.

From WILLIAM J. TAIT, Manager Standard Wood-Turning Company, *Jersey City, N. J.*—Referring to the communication of "C," of Cookport, Pa., in the October number of



Stair Building.—Diagram Illustrating Communication from W. J. Tait.

Carpentry and Building. I would say that any size of cylinder that is suitable for the space he has at his disposal may be used. Eight or nine inch is a very common size for the purpose. He can accomplish this by placing the last riser either in front or behind the spring line of the cylinder, so that the rake of the rail will carry the joints high enough above the floor to meet the level rail at any point he may desire. Referring to this company, I would say that they turn balusters by automatic machinery, making them 2 feet 4 inches and 2 feet 8 inches, using long balusters on the levels. This, of course, makes the level rail 4 inches higher on the level than on the rake from the front of the step. Many carpenters make a practice of placing the last riser at the spring line in small cylinders. Should your correspondent do so and use a cylinder measuring 10¼ inches from face to face of string, his rail would be carried on the natural pitch of his stairway to the proper hight to use a baluster 2 feet 8 inches long. The accompanying sketch illustrates this matter.

Ventilating a Sleeping-Room.

From G. S., *East Springfield, N. Y.*—I have a sleeping-room to ventilate that is located on the ground floor of a house. The room is about 12 x 15 feet. The bed stands near the only window in the room. The question arises, How can I ventilate this room and not have the draft of air on the sleeper and at the same time allow the bed to remain where it now stands? I think I saw some time since a cut of a ventilator to be placed in the window-glass. Is such a device satisfactory, and are they still on the market?

Answer.—There are various schemes which it may be to the interest of our correspondent to consider for the purpose named. Revolving ventilators, which are inserted in a round hole cut in the glass, are sometimes employed, and they are still in the market. The objection of a draft upon the sleepers in the room in question would not, however, be entirely removed by the employment of such a device. When the draft was inward the air would be very likely to fall upon the sleepers; when the draft was outward of course the difficulty would not exist. Ventilation involves two ideas. One, the supply of fresh air, and the other the removal of vitiated air. Accordingly, two openings ought to be considered. Our correspondent does not indicate at all how the room in question is heated, or whether it is heated at all. If an open fireplace existed in the room it, in connection with some opening to admit fresh air, would, in all probability, be satisfactory. If a furnace register leads into the room it in turn, in combination with an opening for the passage outward of the vitiated air, would be satisfactory. We take it, however, that none of these appliances exist, but that the room is of the usual character with no other means available for ventilation than the window itself. This being the case, it is probable that less satisfactory results are to obtained than are to be desired. A plan that is frequently used in offices, and one that has been, under different circumstances, highly recommended for use in houses, puts under the lower sash a box-haped compartment with discharge valves leading upward into the room. One form of this ventilator is a flat board which fills up the space under the lower sash in which are two or more openings which are capped by elbows discharging upward into the room. These openings are provided with suitable valves which can be readily closed so as to shut off the outside air whenever desired. An opening at the lower part of the window provided in some such manner as this would supply the fresh air. The next question is to get rid of the impure air. Possibly the same kind of a construction put at the top of the window, with the mouth of the elbow leading upward on the outside, would be a suitable addition to the device already referred to. It is often argued, however, that the one ventilator is sufficient on account of the space that exists between the two sashes when the lower sash is raised. Of course, the working of such an apparatus would depend entirely upon the temperature of the air in the room as compared with the outside atmosphere. In England there are in use several very carefully devised systems which are in part, at least, applicable under such conditions as our correspondent describes. These are in effect special tubes or pipes that lead into and out from the room, and are arranged so that there is a constant circulation of air from the outside into the room, and in a way to avoid a draft in any part of it. Without knowing more of the exact conditions under which our correspondent is working, we do not think that we can be of much additional service to him. What we have suggested, perhaps, will enable him to work out a plan that will be satisfactory under the circumstances.

A Magnetic Insulator.

From E. K., *Luthersburgh, Pa.*—Knowing that you reply to all kinds of questions in "Correspondence," I take the liberty of asking for information on a subject a little out of the common run. Is there any substance which, placed between a magnet and piece of iron, will destroy the attraction of the former? Is this the principle on which the anti-magnetic watch-shield works that I see so extensively advertised.

Answer.—Our correspondent's question is easily replied to, for there is no substance that we are aware of which cuts off magnetic attraction. No further comment therefore is needed on this portion of his letter. As to the anti-magnetic watch-shield, it follows from what we have just said that the principle of magnetic insulation cannot be made use of in the device. We think an annular-haped magnet is inserted in the rim of the watch in such a way, so it is claimed, as to neutralize magnetic influence from without. We do not know, however, whether the device has or has not proved an efficient protection.

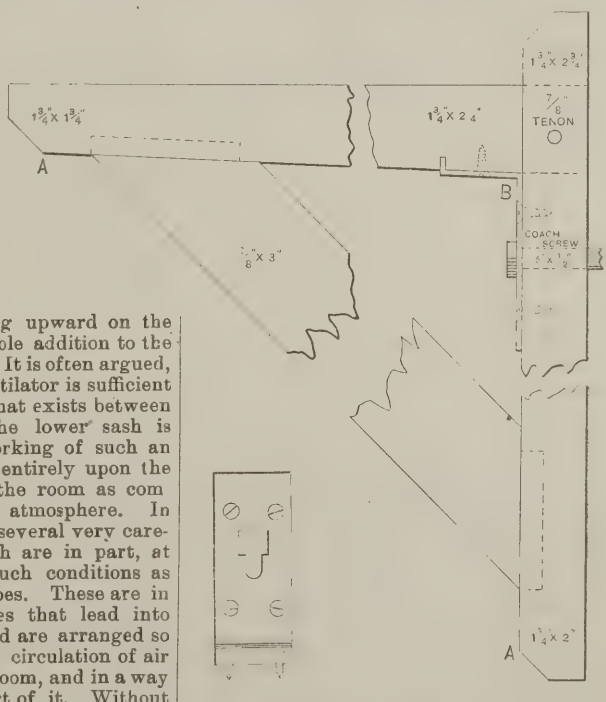
New Roof Over Old.

From S. C. C., *Orwell, N. Y.*—Would you advise putting a standing seam tin roof over an old flat seam tin roof one sixth pitch, or would you advise taking off the old tin?

Answer.—Our advice would be to remove the old tin, and, at the same time, carefully clean off the sheathing boards, so that the new work would not be injured by projecting nails, or anything of that sort. A covering of good building paper will be an additional improvement. There is nothing to be gained in keeping the old roof tin in place, because it would be perforated by the nails driven into the cleats of the new roof. Its presence would be a menace to the durability of the new roof, on account of the facility with which rusting would occur in case any moisture got between the two layers of metal.

Staging Bracket.

From S. F. B., *Wellington, Ohio.*—I inclose a drawing of the kind of staging bracket I am at present using. In these days of close figures and great hurry, a bracket of this kind is a good investment. Very little time is required to put the



New Staging Bracket, Suggested by S. F. B.

bracket up, and there is no waste in the construction. I think the drawing is sufficiently explicit to explain everything. The tenon and mortise are well glued, and when finished the bracket should be painted.

Developer for Print Paper.

From R. O. B., *Warsaw, N. Y.*—Will you please inform me through the columns of *Carpentry and Building* what solution I should use to develop lines on the sample piece of paper which I inclose. The lines should come out black on a white ground.

Note.—Our correspondent incloses us a sample of light yellowish-brown paper, and also a sample of white or blueish-white paper, the latter having an outline diagram of a steam pump printed on it. We presume the yellow paper was a sample of that on which the print was made. It is rather a difficult matter to take a colored piece of paper and discover without chemical analysis what solution it has been dipped in, and without that information, it is, of course, impossible to tell what chemical solution should be used in developing the image after proper exposure in a printing frame. The yellowish color of the paper, however, suggests that a solution of iron has been made use of, but this is, of course, only guess work. Without answering our correspondent's question direct, we will supply formulas for a sensitizer and developer which possibly may be the same that he is after. The sensitizing solution as given in a receipt book is as follows: Sulphate of iron, 10 grams; chlorate of iron, 20 c. cm.; gelatine, 10 grams; tartaric acid, 10 grams; distilled water, 300 grams. The developer to be used with the above solution is given as follows: Gallic acid, 200 grams; alcohol, 20 grams, and water, 1000 grams. We do not feel that the above is a very satisfactory reply to our correspondent's question, but we think he will understand the difficulty which we experience in giving any more exact information.

Bronzing Cast Iron.

From F. P. K., *North Adams, Mass.*—Will you please direct me where I may find information as to the method of bronzing cast iron? If you happen to know of any receipt for doing the same, please publish it in the "Correspondence" department.

Answer.—Though it would give us pleasure to publish a receipt for bronzing cast iron, we think that our correspondent would be much better satisfied if he would write to some dealer in paints and bronzes, and ask them for bronzing materials and directions for applying the same. One way to bronze such an article would be to apply a coat of good copal varnish, and before the latter is entirely dry, dust over the bronze powder by means of a soft brush. Another receipt which we have seen for bronzing iron, is as follows: To one pint of methylated finish add 4 ounces of gum shellac and ½ ounce gum benzoin; put the bottle in a warm place, shaking it occasionally. When the gum is dissolved, let it stand in a cool place two or three days to settle, then gently pour off the clear into another bottle, cork it well and keep it for finest work. The sediment left in the first bottle, by adding a sufficient quantity of spirits to make it workable, will do for the first coat or coarser work, when strained through a fine cloth. Next get ½ pound finely ground bronze green—the shade may be varied by using a little lamp-black—red ochre or yellow ochre; let the iron be clean and smooth, then take as much varnish as may be required, and add to the green color in sufficient quantity; slightly warm the article to be bronzed, and with a soft brush lay a thin coat on it. When that is dry, if necessary, lay another coat on it, and repeat until well covered. Take a small quantity of the varnish and touch the prominent parts with it; before it is dry, with a dry pencil lay on a small quantity of gold powder. Varnish over all.

New Drawing Instrument.

From C. R., *Buffalo, N. Y.*—I inclose a tracing of an instrument by which the drawing of arcs or circles of large diameter may be accomplished without the employment of a trammel compass. In fact, the instrument is useful in places where it is difficult to use ordinary devices. I find it remarkably serviceable in my work, and both stove draftsmen and pattern-makers will easily recognize its application. The principle upon which it is constructed is that a circle may be drawn through any three given points. By this instrument arcs of concentric circles may be drawn by changing the position of the bar which holds the pencil or pen by the set screw, B. A perspective view of the device is shown in Fig. 1, while Fig. 2 is a top view one-eighth full size. The strips composing the instrument may be made $\frac{5}{16}$ inches thick and 1¼ inches wide. Maple wood is desirable for the purpose. In the top view the marking bar, K, is drawn out of position in order to show the hinge at the center. To use the tool the pins, J J, are stuck into the drawing board at the extremities of the arc required, and the instrument is then adjusted so that the edges F G, will intersect at G. The point G is the highest point in the arc, and is that at which the pencil or pen is set preparatory to moving the edges F G back and forth against the pins, J J. The tool may be used as a perspective lineal by substituting a long bar for K, and inserting it in the hole, H. The tool that I am using is made of wood entirely, except the screws. The handles of these are also of wood. The hinge A was taken from a 10 cent pocket rule.

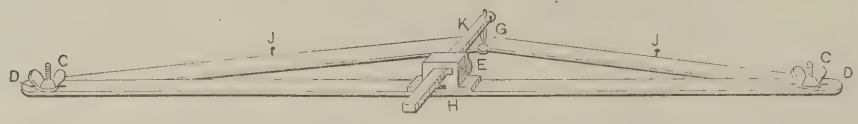


Fig. 1.—Perspective View of Drawing Instrument, Designed by C. R.

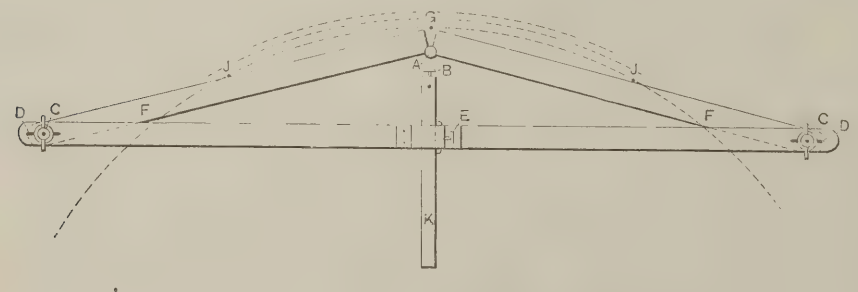


Fig. 2.—Top View of C. R.'s Drawing Instrument.

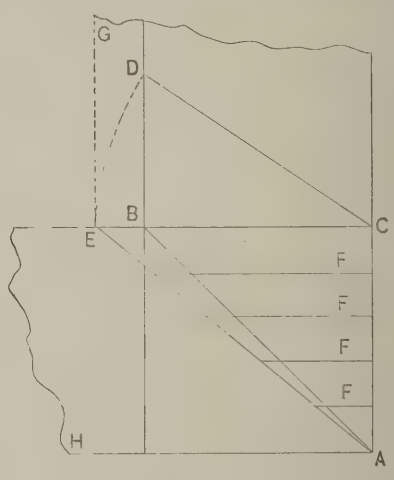
Paint for Metal Roofing.

From A. & F., *Montgomery.*—Will you please give us a formula for what you consider the best paint for a metal roof, either tin or iron?

Note.—Our correspondent has asked us one of the many questions which it is absolutely impossible for us to answer directly. The fact is that there are an innumerable number of paints for metal roofs, all of which possess merit, and between which there is probably very little choice. We do not know that we have any preference in the matter, and should be inclined to use one well-known paint as soon as another. There are various articles in the market supplied by well-known manufacturers, and all we can do is to refer to them in a general way. We believe it is generally admitted that the efficiency of a roofing paint depends upon the oil, which, drying, leaves a hard surface. The best pigment to use, therefore, other things being equal, is that which will take the most oil. Perhaps the commonest paint is the mineral paint, made from iron oxide in some one of its forms. Asbestos is also the basis of a well-known and serviceable paint. Besides these there are the silica and black lead paints, all of which have their special merits, and all of which will probably prove satisfactory in use. We regret that we cannot supply our correspondent with more definite information, but we think that if he acts on our suggestions, and uses any of the above paints supplied by some reputable concern, he will not fail to be satisfied.

Framing Hip Roofs.

From F. D. G., *Council Bluffs, Iowa.*—Here I am bobbing up serenely with another method of framing hip roofs. Let A in the sketch represent one corner in the building; A B is the run of the hip rafter; B D is the rise of the roof; D C is the common rafter and A E is the length of the hip rafter; F F F are jack rafters, with their lengths and bevels to fit the hips. I like the method here shown, because it is quickly laid out,



Framing Hip Roofs.

is accurate and easily understood. If we should raise E to one-third pitch, as per diagram, it would come plumb over A B C; hence it is plain to perceive why E A is the length of the hip and F F F to A E the proper lengths of the jacks and the proper bevels to fit the hip. I shall not attempt to tell how to back the hip, or to get the bevels for the same, for I have nothing new or novel in that connection.

A Short Method of Multiplication.

From C. O. Y., *Litchfield, Minn.*—By the ordinary methods of computing decimals a vast amount of figures are involved, which are neither essential nor add anything whatever to the correctness of the required result, since in practice, orders lower than hundredths are disregarded. By rejecting those decimals in both multiplicand and multiplier, which give rise to denominations lower than those required in the answer, the process of multiplication can be greatly shortened, and much useless labor and tedious figuring avoided. This is effected by applying the following philosophic and strictly scientific method which was given to me by a professor in one of our public schools several years ago. It has been very valuable to me, and I think others will find it the same.

Rule.—Reverse one of the terms and write it for the multiplier, so that its hundredths place will fall under the units place of the multiplicand. Reject those figures in the multiplicand which extend to the right of the figure then in use in the multiplier. Carry the tens, however, from the product of the nearest rejected figure (multiplied

mentally), and one more when the unit figure of said product is five or over. Set the right-hand figures of the partial products in the same column, add and point off two places from the right of the product; the result will be the answer in units and hundredths, or dollars and cents. I will now attempt to elucidate this method of multiplication more fully, and illustrate its practical application. We will, for example, find the area of a circle, which is $14\frac{11}{32}$ inches in diameter—$14\frac{11}{32}$ will read 14.344 as a decimal. We write one of the figures in reversed order for the multiplier, so that its unit 4 comes under the second decimal place of the multiplicand; if 3 decimal places were required in the product, we would write the units under the third decimal place; if 4, under the fourth, &c. We first multiply by 1, as in ordinary multiplication, obtaining 14 344 for the first partial product; then mark off the 1 and 4 above it with a vertical line and call them rejected. We now proceed to multiply by the 4, beginning with the 4 above it; add the tens, however, from the rejected figure 4, saying 4×4 are 16 which is $1\frac{6}{10}$. Now, in this system of calculation ½ or over is counted a whole one, and, what is under is disregarded; thus the gain and loss will be equalized, or nearly so. For this reason we carry from the product of the nearest rejected figure, 1, when it is 5 or over, 2 when it is 15 or over, 3 when it is 25 or over, &c. Hence we say 4×4 are 16 and 2, from the rejected figure 4, is 18, which we set under the right hand figure 4, of the first partial product; multiplying on in the usual manner we obtain 5738 for the second partial product; we now mark off 4 and 4, and proceed to multiply by the 3, saying 3×3 are 9 and 1 (one-tenth) is 10 Multiplying on we obtain 430 for the third partial product. We now mark off the two 3's and call them rejected; then multiply by 4, saying 4×4 are 16 and 1 (one-tenth) is 17; put the 7 down under the third partial product; 4×1 is 4 and 1 is 5, which is 57 for the fourth partial product. Mark the two 4's as rejected and say 4×1 is 4 and 2 tens (from the rejected figures) is 6; place it in line with the other partial products, add them, and point off. The two decimal places give us the result, 205.75, which must be multiplied by the area of a 1-inch circle, which is 0.7854. Placing this in reversed order under 205,75, with the 7 under the 7, this would give the unit of the whole number, if there had been any, a place under the second decimal place of the multiplicand. I have put a cipher there to show the meaning. In this case we reject the figure 5 and say 7×7 are 49 and 4 tens from the rejected figure are 53. Go on as before and we have 161.60 square inches—the desired result. The superiority of the short over the ordinary method of multiplication will be more clearly illustrated by the following example We see that by the short method all decimals lower than those required in the product are avoided, and yet the answer obtained is sufficiently exact for all practical purposes. Multiply 8.4125 by 7.6875, retaining only two decimal places in the product.

14 344	
443.41	
14344	
5738	
430	
57	
6	
205.75	
4587.0	
14403	
1646	
103	
8	
161.60	

Ordinary method.	Short method.
8.4125	8 4125
7.6875	5786.7
420625	5889
588875	505
673000	67
504750	6
588875	
	64.67
64 67109375	

We write the smaller number in reversed order for the multiplier, so that its unit (7) will fall under the second decimal place of the multiplicand. If 3 decimals were required in the product, we would write unit under the third decimal place; if 4, under the fourth, &c. Occasionally the answer falls short by one; this deficiency, however, is obviated by carrying the tens from the second rejected figure to the product of the first or nearest rejected, when it happens to be nearly 5.15, 25.35, &c. In the preceding example we say 7×2 (the nearest rejected figure) are 14, which will give one to carry, but by adding the tens from 5 (the second rejected figure) to the 14 it makes 18, and consequently gives 2 to carry.

Oak for Interior Finish.

From J. M., *Elmhurst, Ill*—Please inform me if I can use oak for window jambs in a frame building, the inside trimming to be of oak. The question is, will it warp or get out of shape if used for jambs, since part of them will be exposed to the weather?

Note.—Our correspondent's question is somewhat peculiar in its wording, and perhaps we do not correctly understand him. Speaking, therefore, in general terms, we would say that we see no reason why oak may not be used to the same advantage as almost any other wood under the circumstances named. Something, of course, will depend upon the kind of oak, and also the thoroughness with which it is seasoned—to say nothing of the care with which the parts are joined. The surface should be finished either with oil or paint.

Copper Gutters on Galvanized-Iron Cornices.

From J. S. R., *Springfield, Ill.*—I would like to inquire, through *Carpentry and Building* whether a copper gutter hooked on to a galvanized iron cornice would create an electric battery, and if so, would it increase the danger of the building being struck by lightning. Would you advise the use of paper felt between the two metals?

Answer.—Copper and galvanized iron placed together as our correspondent mentions will when moistened undoubtedly create an electric current, and result in greater or less corrosion of the metals. Such action, however, would not in any way affect the liability of the building being struck by lightning. So far as the danger is concerned, we therefore think it entirely unnecessary to use paper felt, as suggested. On the other hand, seeing that the metals will be corroded through electrical action, it might be a wise provision to insulate them in the way mentioned

REFERRED TO OUR READERS.

Hard Finish.

From J. D. M., *Benton Harbor, Mich.*—I have recently encountered a specification relating to a plaster finish, about which I desire to ask the opinion of the readers of *Carpentry and Building*. The soapstone finish prepared by the American Soapstone Finish Company, of Nashua, N. H, is specified. The finish is to be a compound of finishing lime, putty and the patent soapstone finish in parts—3 of the latter to 2 of the former. The ingredients are to be thoroughly mixed together, and to stand at least two days before using. If any of the readers of *Carpentry and Building* have employed the finish in this way, I shall be glad to hear from them with reference to the durability and the actual quality of the work.

Shear Nailing.

From J. D M., *Benton Harbor, Mich.*—Some time since the term "shear nailing," or rather "single shear nailing" occurred in *Carpentry and Building*, being in an article by one of the contributors on the subject of trussing a floor. I cannot find the article at present, and so am unable to make specific reference. I would like to learn the meaning of the term. I have asked all the mechanics I have met without being able to learn what it means. Some of those with whom I have talked claimed to have worked in almost every place, from New York to California, but none have heard the term "nailing in single shear."

Arch for Cistern.

From R. G., *Whitestone, N. Y.*—I wish to be informed concerning the construction of an arch for a cistern. Which is the correct way to start an arch? If some of the readers of *Carpentry and Building* will furnish information on this subject, they will oblige a constant reader.

TRADE NOTES.

A NEW CLUBHOUSE near the Wissahicken River, Fairmount, Park, Philadelphia, is in progress. The plans and general specifications have been prepared by Constable Bros., architects and engineers, 149 Broadway, New York and 707 Walnut street, Philadelphia.

THE EGAN COMPANY, of Cincinnati, have recently put in a new electric-light plant consisting of a dynamo and 250 incandescent lamps of 16 candle-power each. The system employed is the Hauss Electric Lighting Company's productions, Cincinnati.

THE NEPONSET WATER PROOF PAPER is an article manufactured by F. W. Bird & Son, of East Walpole, Mass. It has been in the market for some two years past, in which time it has been very carefully tested and its merits proven. The special feature to which the makers direct attention are the perfect water-proof qualities of the material. It is also air tight. In demonstration of this feature of the paper they are sending out a little cup made of the paper, which they invite architects, builders and the public in general to fill with water and note the result. The cup holds comparatively a small quantity, and therefore it is necessary to add to it at frequent intervals to replace what is taken up by evaporation. The result following the experiment is that the water does not penetrate the paper, but is held by it for months. The firm guarantee every roll of paper that they send out to be equal in water-proof qualities to the little cup referred to. They assert further that, unlike any other paper, it does not lose its water-proof qualities when exposed to the severest weather. On account of the air-proof qualities, they state that a building covered with it can be warmed with much less fuel than if covered with any other paper in the market. It is put up in rolls 36 inches wide, weighing about 60 pounds to the roll. The thickness is indicated by assuming that 100 square feet weigh about 8 pounds. Those of our readers who are looking for an article of this kind will be interested in the samples, including the cup above referred to, which these manufacturers are sending out.

THE SENECA FALLS MFG. COMPANY, 209 Water street, Seneca Falls, N. Y., are directing attention to the Diamond mortising machine, the Acme circular saw and the Empire scroll saw, three foot-power machines, with which many of our readers are already acquainted. The features in each of these are briefly set forth in their card, which appears in another part of this issue.

WE HAVE RECEIVED from the National Building Plan Association, of Detroit, Mich., a copy of their small quarto book, entitled "Artistic Homes." The little volume contains 32 designs of residences, stores, churches, schoolhouses, town halls, &c. The scheme of the association is to cheapen working plans and designs of buildings. The designs presented in this pamphlet are in the nature of a catalogue, the working drawings of which will be supplied by the association at the prices stated in the descriptive text. The prices named, it is scarcely necessary to mention, are considerably below those ordinarily charged by architects. This, it is explained, is made possible by the fact that a large number of duplicates are made at one time. The estimates of cost, the figures of which accompany each design, are based upon a schednle of prices, an outline of which is presented in the preface.

TANNER, KEENEY & BARKELEW, 90 and 92 Pacific avenue, Jersey City, N. J., are putting upon the market a new article in laundry tubs, which they have named Keystone. They are sending out a most interesting specimen of the article, being in the form of a miniature tub, and adapted to the purpose of an ink well. The material of which the tub is composed is a novelty in the market. It is not a cement; it has no lime about it, and it is not a metal, in the ordinary sense of the term, and yet we understand that it is made molten, and in process of manufacture the tubs are cast in

molds. The surface, both inside and outside of the article, is very smooth, resulting from the fact that iron molds are used for the casting. The special feature of the article is the cheapness at which it is offered. Circulars are supplied to all applicants.

THE EDWARD STORM SPRING COMPANY, Limited, of Poughkeepsie, N. Y., for which John H. Graham & Co., No. 113 Chambers street, New York, are agents, are directing attention to the New York Safety dumb-waiter fixtures, covered both by United States and Canadian patents, recently granted. These fixtures, they inform the trade, make the most complete and simple as well as absolutely safe waiter that can be produced. Catalogues are sent upon application.

J. A. FAY & Co., of Cincinnati, Ohio, are so well known throughout the country as manufacturers of wood-working machinery, as to make their name a shop if not a household word. A number of their devices are shown in their card, which appears in another part of this issue.

A MEANS OF APPLYING scales of linear measurements to drawing boards and T squares was patented a short time since by William Ward, of Council Bluffs, Iowa. The objects in view are locating points on drawings, locating points while copying drawings, and locating points when reducing from one size to another. A scale is fastened across the end of the drawing board, being let into the surface so as to be flush with the top of the board. Along the edge of the T square a similar scale is fastened by means of a suitable number of clamps. By means of the end scale first referred to, the distance across the board is readily indicated, while by means of the scale on the blade of the T square the distance lengthwise is measured. The inventor, in his specification, recites that the manner of finding a point, is by its marking distance from one line of reference with dividers or scales, drawing an auxiliary line through the mark and finding the position of the point upon this auxiliary line by a separate measurement of its distance from the other line of reference. The inventor accomplishes this by drawing lines of reference perpendicular to each other and parallel to the two scales. The ciphers of the scales are adjusted to these lines of reference and a point is located by means of the units of the scale, measuring crosswise and lengthwise, as may be required. The second object above recited—namely, that of locating points while copying drawings, is attained by setting the scales parallel to each other. The third object—namely, that of locating points when reducing or enlarging drawings, is secured by making the copy with scales of a different denomination from those placed upon the original.

CHARLES A. STRELINGER & Co., of Detroit, Mich., in another part of this issue, direct attention to sets of Jennings pattern augur Bits, of which they are making a specialty. The sets consist of 13 sizes, assorted and furnished in a handsome case with spring fastening. They also direct attention to their catalogue of wood-workers' tools, which they are sending to the trade.

EDWARD E. GOLD & Co., northeast corner of Frankfort and Cliff streets, New York, are directing attention to their Combined Coil heaters for direct and indirect steam heating. The direct heater which they are offering to the trade is claimed to be the only article in the market by which the heat can be regulated without touching steam valves. Their catalogue is offered to all applicants.

WE HAVE RECEIVED from Charles Graham & Sons, architects and builders, Nos. 305 to 309 East Forty-third street, New York, a descriptive pamphlet illustrating 21 new dwellings, located on the crown of Lenox Hill, being built by this firm to their own designs, and which are now in the market. Our readers will remember this firm in the past on account of their commanding position as stair builders, and also by reason of the description of their shop, which occupied a portion of our pages some time since. They have more recently gone into the general contracting business, giving up the former specialty which occupied their attention. They still continue to have one of the finest wood-working shops to be found in the vicinity of New York.

CORDESMAN, MEYER & Co., Nos. 186 and 188 West Second street, Cincinnati, Ohio, are directing attention to their extensive line of wood-working machinery, which they describe as being of the finest grade and of the latest improved patterns. They invite the trade to send for circulars and price lists.

THE PATENT FOLDING GATES AND GUARDS manufactured by the Composite Iron Works Company, No. 83 Reade street, New York, are of interest to architects and builders on account of the mechanical features involved and the thorough construction employed. The company also make a general line of cast and wrought iron work. Catalogues are supplied on application and estimates furnished.

PROF. R. H. THURSTON, of Sibley College, Cornell University, has issued a circular to his friends and clients, to the effect that his engagements are such that at present he is compelled, as a rule, to decline all applications for services in suits at law, or in consultation, which may demand any considerable amount of time. He states that in important cases he could give testimony before a commissioner, but that he could not undertake to appear in court. In all cases he prefers to respond to the interrogatories of the court, with the approval of both sides, rather than serve either litigant alone.

A RAIN-WATER CUT-OFF which affords the opportunity of rinsing a roof before allowing the water to flow into the cistern is an article in which builders, as well as house owners, should feel an interest. G. W. Howell, of Covington, Ky., directs attention to a device of this kind made in various sizes. Illustrations appear in his advertisement in another part of this issue.

CREOSOTE WOOD STAINS for shingles, fences, clap-boards, &c., are something that is of interest to all who have occasion to apply a finish to outside wood work. Samuel Cabot, No. 70 Kilby street, Boston, Mass., the manufacturer, invites the trade to send for samples on wood and circulars. The stains are pronounced durable and artistic in character.

ST. LOUIS PAPERS contain particulars of an immense store building that is to be erected in that city on Washington avenue. It is described as the largest single store building in America, being a structure of seven stories in hight, with a floor area aggregating over 7¼ acres. The building will have four street fronts, and will face 270 feet on Washington avenue. The hight from pavement to the cornice will be 125 feet. The estimated cost of the entire structure is put at nearly three-quarters of a million of dollars. We understand that it is to be finished with a copper cornice. The plans and specifications have been prepared by Isaac S. Taylor, of St. Louis. The building is to be completed for occupancy by January 1, 1889.

THE GURNEY HOT WATER HEATER COMPANY, No. 237 Franklin street, Boston, Mass., are directing attention to their new instruction book which is furnished gratis to architects and steam fitters upon application. The Gurney hot water heater, which is made in seven sizes, has the advantage of being quickly set up, requires no brickwork, and, it is said, does not corrode or rust out to the same extent as wrought iron. The company claim for the heater that it presents more water surface to the direct action of the fire than others.

IN ANOTHER PART of this issue Merchant & Co., of Philadelphia, Pa., present the Star ventilator, which they guarantee to be the best in the market for the cure of smoky chimneys and the ventilation of buildings generally. This device, which has been before the public for some time past, embodies in its construction a number of well-known and well-defined principles which render it effective in action. It is neat in appearance, thorough in construction and is attaining a well-merited reputation where used on residences, factories, mills, also on cars, yachts and boats in general.

THE FIRM OF ELLISON & ROBINSON, of Allegheny City, Pa., wh have been supplying Ellison's combined aundry table and bosom board, have rece tly been succeeded by J. M. Ellison, and the office removed to 67 Federal street, Allegheny City. The leading features of the article manufactured are simplicity, durability and cheapness.

FROM RECENT FILES of Toledo papers comes the information that Isaac D. Smead & Co., of that city, have lately been awarded contracts for furnishing heating and ventilating apparatus to a number of public buildings. Among those mentioned are the following: Court House at Newport, Ky.; high school building at Atlanta, Ga.; also at Lima, Ohio; Kent, Ohio; Princeton, Ind., and Sydney, Ind. A normal school building at Wadsworth, Ohio.; a public school building at Cleveland, Ohio; also one at West Alexandria, Ohio, and two each in Cincinnati, Ohio and Richmond, Ind. They also have the contract for the new city hall at Wooster, Ohio.

THE MILLER LOCK COMPANY, No. 813 Cherry street, Philadelphia, Pa., are directing attention to the Champion chest lock, important improvements in which have been introduced during the present season. Those who like a lock which operates without a key, and which is "unpickable," will be pleased with a device of this kind. The company direct attention to their illustrated catalogue, and a steel pocket tool, which they are sending with it to those who apply.

WE LEARN that the Globe Iron Roofing and Corrugating Company, of Cincinnati, Ohio, have recently completed the contract for roofing the United States Quartermaster's Depot building, at Jeffersonville, Ind. The standard Globe standing seam roof was used upon this job. It is claimed that this is the largest continuous roof in the United States. The length is 3200 feet, or considerably over half a mile. The superficial area of the roof is upward of 2000 squares, equivalent to about 100 tons of roofing iron. No. 24 gauge was employed throughout the work. We have already referred to this contract in the past. The company removed the slate roof and replaced it with iron, and accomplished the work in the short space of 30 days. We are informed that the Government officers connected with the depot have presented the company, entirely unsolicited, with several very strong testimonials concerning the rapidity with which the work was finished and the quality of the work itself. The company point with pride to the fact that not a single leak could be discovered in the entire work when completed and put to practical test.

A NEW VOLUME, and one that must be regarded as an important addition to the library of architects and builders, reaches us just as we go to press, and too late for formal review in this issue. It is entitled "Interior Decoration," and is by Arnold W. Brunner and Thomas Tryon. It contains 65 illustrations and is brought out by W. T. Comstock. We shall have more to say about this volume in a future number.

THE J. F. PEASE FURNACE COMPANY, Syracuse, N. Y., and Toronto, Ont., with branch offices in New York City, Boston and Chicago, invite architects and builders to send for their 1887 catalogue of the Economy heaters. Their combination steam and warm-air heaters are at present very popular in many directions.

THE GAUGE TOOL COMPANY, Vineland, N. J., in directing attention to their self-setting plane, inform the trade that if local dealers do not keep it in stock they will send a sample on trial, on conditions which are explained in their circular.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, of Cincinnati, report continued activity in the demand for their specialties. They inform us that the month just closed was the banner month in their existence. During that time they handled 600 tons of roofing, including a shipment of 4 carloads to one house.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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VOLUME IX. NEW YORK, DECEMBER, 1887. NUMBER 12

NOTES AND COMMENTS.

WE have referred in the past to some of the different propositions which have been made in the way of utilizing the site of what is now known as Madison Square Garden. Quite recently one of the schemes proposed has taken shape, and a new building is to be erected to cost about $1,500,000. The special feature will be a tower 300 feet high, in which will be two elevators running to the top. This tower will afford a lookout from which a bird's-eye view of the city can be obtained unsurpassed by any other point now accessible. The building is to contain accommodations for various kinds of performances, supplying the same need that Madison Square Garden supplies at present, and also containing rooms for such purposes as musical assemblies, &c. It is anticipated, we believe, that this building will be commenced in May. It will be driven to completion as rapidly as possible.

VARIOUS estimates are being indulged in at the present time with reference to the building business in New York. The question is whether or not building has been exceeding the needs of the population in this vicinity for some time past. The marvelous activity in the building trades of late is regarded by some authorities as abnormal. One estimate shows that house accommodations have been provided in New York during the past year for upward of 71,000 persons. On the other hand, the increase of population is supposed to be not more than 40,000 people. It is very hard to determine the question by such figures alone, from the fact that owing to the lack of rapid transit facilities for many years past the lower residence portion of the island became very much crowded, and a very large number of buildings would naturally be required to relieve the pressure in these parts of the city. On the other hand, many people removed to New Jersey, and also to Brooklyn, who would have been glad to live in New York if houses could have been found. These people, it is believed, are at present returning in considerable numbers to the city. The extensive building of elevated railroads in Brooklyn, which is the special feature in that city at present, has created a veritable building boom there. Many wiseacres are saying that in that city also building is being overdone. But for reasons above-mentioned, it is hard to base an opinion upon the meager facts at command. From all indications at present there will be active building in both these cities for the new year.

A NOTICE to architects has been issued by Mayor Hewitt, of New York, as Chairman of the Sinking Fund Commission, to the effect that until March 1 next the Board will receive plans and specifications for the erection of the proposed new municipal building for this city. An estimate of the cost must accompany each plan in sufficient detail to enable the Commission to modify the plans if they deem it advisable. For plans which may be adjudged the best by the Commissioners, a premium of $5000 will be paid; for the next in excellence, $4000; for the third, $3000; for the fourth, $2000 and for the fifth, $1000. No obligation is to rest upon the Commission to award premiums for plans which shall not be regarded as meritorious. The plans are to become the property of the city, and may be used and combined in any manner the city may deem best. No obligation is to be created by the acceptance of any plans to employ the author as the architect to construct the building.

THOSE of our readers who are interested in plumbing and sanitary matters generally will find elsewhere in this issue an illustrated and descriptive article on New York public school sanitation, which will well repay their careful attention. The system of plumbing there described has received the approval of the New York Board of Health, and while it is subject to variation in details of arrangement it is expected that the general scheme will be carried into effect. As pointed out in the article, the chief requirements in such sanitation are the odorless and efficient removal of the sewage under the conditions peculiar to a school, and the warming of the outbuilding or apartment so that the scholars shall not be subject to extreme variations in temperature when using the closets during the winter season. This second requirement is one that has received very little attention in the past, though its real importance cannot be overestimated. For the arrangements described elsewhere it is claimed that all the serious objections to the old and inefficient system of school sanitation have been overcome, and no one can read the article without being struck by the care that has been exercised in making all the details conform to the best modern practice. A school building ignorantly plumbed is a most prolific source of sickness and disease, and when it is considered that the sufferers are the little people of the city the necessity of doing everything possible for their physical welfare is apparent.

ONE of the oldest architects in the United States, and a man that was noted for the work constructed under his supervision, died late in October. We refer to Thomas U. Walter. Mr. Walter was 83 years of age, and, while being the oldest and most distinguished member of his profession in Philadelphia, was also one of the best known architects in the United States. A brief sketch of his career will be of interest in this connection: He was born in Philadelphia, September 4, 1804, and studied architecture under Mr. William Strickland and afterward mathematics under David McClure, then distinguished as a teacher of that science. He applied himself assiduously to study for many years before he commenced the practice of his profession. He designed in 1831 and superintended the erection of the Philadelphia county prison. His designs for the Girard College were adopted by City Councils in 1833, and that magnificent building, perhaps the finest specimen of classic architecture on the American Continent, was constructed throughout from Mr. Walter's designs and under his immediate supervision. This work occupied him for 14 years. In 1851 Mr. Walter's plans for the extension for the Capitol at Washington were adopted, and he was appointed architect of the work by President Fillmore, a position which he held for 14 years. In addition to the work of the Capitol extension, he planned and executed the new dome of the Capitol, the east and west wings of the Patent Office, and the extension of the General Post Office. He also designed the new Treasury building and the Government Hospital for the Insane. During the latter years of his life Mr. Walter acted as assistant to Architect McArthur at the new public buildings, Philadelphia. In 1853 Mr. Walter received the title of Doctor of Philosophy from the University of Lewisburg, and in 1857 that of Doctor of Laws from Harvard University. He held for many years a professorship of architecture in the Franklin Institute, and was a member of the American Philosophical Society and of many other literary and scientific institutions. He was one of the founders of the American Institute of Architects, and at the last meeting of that body a short time since resigned its active presidency.

THE prospectus issued by the New York Trade Schools, First avenue, Sixty-Seventh and Sixty-Eight streets, New York, is an eight-page illustrated circulator giving a very full description and explanation of the object of the institution and the work that has already been done by it. The seventh season began October 26, and the course of instruction includes evening classes in plumbing, bricklaying, plastering, stonecutting, house and sign painting, frescopainting, wood carving, carpentry and blacksmiths' work. The day classes for the same season are in plumbing, house and sign painting, stone cutting and tailoring. As we have mentioned before, free instruction is not given at the schools, but the charges are very moderate and include the use of tools and materials. The usefulness of the schools is shown in their present prosperity, and the fact that enlarged class room has been found necessary. Six years ago two workshops accommodated all the scholars, while now the buildings cover a plot of land 200 by 113 feet, and more space is needed. The first year of the institution 30 scholars were in attendance, the second season 88, the third 207, the fourth 198, the fifth 304, and last year the scholars, who came from many different States, numbered 337. No more flattering testimonial to the merits of the institution can be given than this simple record of the annual increase in attendance. In a copy of the Bulletin of the New York Trade Schools, sent with the prospectus, an illustration is

given of a five-story brick house built by the young men. The building is 96 feet front by 132 feet in depth, with walls from 16 inches to 2 feet in thickness. It was designed to be built in three sections, two of which were built by young men from the bricklaying classes of 1884–5 and 1885–6, while the remaining section is now being built by the class of last season. The young men were paid according to the brick laid, and the building is said to show the most thorough and satisfactory workmanship. We will close our notice with a quotation from the prospectus itself: "The New York trade schools are not intended to be either a charitable or a money-making institution. They are not managed in the interest of, nor are they in opposition to, any trade organization. The New York trade schools are established solely for the benefit of such young men as may desire to avail themselves of the opportunities they offer."

THE coming on of winter turns the thoughts of many people to the house-heating problem—a problem that was solved in a very crude way long before the present era, and which ever since has been seeking a more and more perfect solution without as yet arriving at absolute perfection. So long as hot air, steam and hot water are each separately advocated as the best system by many disinterested experts, it is futile, if not foolish, for any one to claim paramount excellence for the one method he considers best fitted to satisfy the general want. It is pretty generally admitted that to certain special circumstances one or other of the heating systems mentioned is most suited but in the vast majority of cases where it is necessary to secure artificial warmth for comfort in living during the winter season, it is unreasonable to assert positively that any one of the systems will prove beyond all peradventure most satisfactory. While in the present state of the science of house heating there is, therefore, no existing standard of excellence, it is nevertheless true that popular opinion, as indicated by demand for heating appliances, is undergoing a gradual, but definite change, and the systems which a few years ago were little thought of are now coming into extensive application. The hot-air furnace is a very old household appliance, but only within a comparatively few years has it been made in its present general form. Steam heating is a more recent institution, and hot water, in this country at least, is the latest system introduced for warming buildings. Between the systems of hot air and steam or water it is difficult to draw even the broadest comparisons, for the two (classing steam and water together) are quite different and cannot be criticised or commended from the same standpoint. Steam heating and hot-water heating, however, possess a number of features in common, and it is, therefore, easier for a person in search of a heating appliance to pass judgment upon their relative merits.

REVIEWING the course of popular demand, we see that steam and hot water are in much more extensive use now than a quarter of a century ago; and coming down to the last ten years we find quite a notable increase in the number of hot water apparatus in use. There is no more direct evidence in proof of this increased popularity than the many new patterns and designs of hot-water radiators and heaters that have lately been put on the market. The lines of improvement are in two directions —efficiency and artistic merit. With the former end in view, boilers are being designed to utilize more fully the heat of the coal, and radiators are planned which shall transmit heat to the air most rapidly and efficiently. Direct radiators, it is also pleasing to note, are being greatly improved from the standpoint of beauty, and, while formerly the simplest and plainest arrangement of pipes or castings was thought amply good enough for the purpose, there is now a great deal of taste displayed in their artistic designing and decoration. Fortunately there has as yet been little attempt to build up trade in this line by cutting prices and correspondingly lowering quality, but as soon as competition grows a little more active this result may be looked for. However, that is an evil which need not be anticipated. At present there are no serious causes of complaint. Steam and hot-water heaters, as now made, though they do not embody every advantage and excellence, are yet serviceable and efficient appliances, and the radiators that go with them are, as the rule, good transmitters of heat, while many of them possess the further merit of ornamentation.

THE DEATH of A. J. Beresford-Hope which occurred late in October, causes our English architectural exchanges to publish many extracts from his writings. The following remarks on colored brick will, perhaps, interest our readers: Those who have studied the progress of architecture cannot fail to have realized how much their resources in the way of material have been developed; how, instead of being confined to mere Bath and Portland stone, or the ordinary brick, we have got into the polychromatic development of real material. If you go into this style at all you should do so boldly. The materials should be of the best sort, each in its proper place, and all well and strongly exhibited. We too often see the polychromatic style of architecture carried out with the yellow brick of London, with a few red bricks thrown in here and there. That will not do; the bands should be bold and broad, and the colors distinct. By some means, fair or foul, you should induce the the brick-maker to give better bricks, such as are used in many of the brick buildings on the Continent. The magnificent Hospital of Milan is built of red bricks, with moldings carried out in the same material—hard red bricks, which stand the wear and tear of centuries. If we could get that material in England, well and good; if not, we should go elsewhere for it. That which we use at present—the yellow, red and black—fuses into a uniform chocolate under the London smoke.

THE Board of Education of the City of New York have recently concluded to introduce manual training into the public schools. As our readers know from frequent reference to this matter the expediency of such a step has been under consideration for some years past. The sentiment of the community appears to be so pronounced in favor of the scheme, at least to the extent of giving it a fair trial, that the board has finally concluded to make the experiment. Mr. Charles L. Holt, chairman of the Committee on Courses of Education and School Books, submitted a report a short time since, being the outcome of a consideration of the system of manual training in vogue in Europe and in many cities of this country. The conclusion of the committee is that the system will be a valuable addition to the present school course, and, accordingly, the advice is given that the system be introduced. The report of the committee presents several arguments in support of the proposed system. Among these we note the following: "Manual training would be an improvement to the present course of study. Instruction in drawing and the introduction of object teaching have proved of the greatest advantage, and these studies lead directly and naturally to those subjects and methods at present under discussion. It has come to be generally recognized as true that a certain amount of work, some application of mental power with bodily power, some productions of physical thought and intention, implying the training of the senses, especially with the hand and the eye, are needed to produce a well-trained mind." Manual training, it is stated, is admissible into the public schools only as a means of general and not special education. For such instructions the report of the committee advises that the following types of manual training should be introduced; carpenter-work or the use of wood-working tools for boys; modeling in clay for boys and girls; constructive work in paper, pasteboard and other suitable material for boys and girls; drawing to scale for boys and girls; sewing for girls, and cooking for girls. We deem this movement of the greatest importance, and shall watch the introduction of practical studies into the schools of the metropolis with a lively interest.

BAKED MUD is the abrupt, if not facetious, way in which one of our building exchanges introduces its account of the proceedings of the convention of the Association of Brick Manufacturers of the United States, allusion to which was made in our last issue. We suppose, of course, that brick is in reality baked mud, but at the same time, all baked mud is not brick. We do not think the attempt at the sensational or facetious in heading the accounts of proceedings of societies which are appropriate for publication in a building trade journal is anything to be recommended. Better be dignified, we think, in all cases and hold strictly to the facts.

THE PLATES.

Plate XLV contains engravings made from photographs of the interior sheet-metal work in the new court house at Columbus, Ohio, which is elsewhere described in this issue in detail.

We devote Plates XLVI and XLVII to illustrations of the new plan of sanitation for schoolhouses adopted in New York City. Particulars appear in another place.

An incident of the jubilee year of Queen Victoria was the gift from Mr. George W. Childs, the well-known journalist of Philadelphia, to the town of Stratford-upon-Avon, of a drinking fountain and clock tower. This was erected as a tribute to the memory of Shakespeare and as a mark and memorial of the friendly feelings now existing between Great Britain and America. A view of the structure is shown in Plate XLVIII. The plan of the ground and second story is square, with buttresses placed diagonally at the corners. These are terminated by lions and eagles, alternately, bearing the arms and symbols of the two countries. On two sides are large massive drinking troughs for cattle; beneath are troughs for dogs and sheep. On one side is a trough and spout for man. The whole of the plinth as high as the upper line of the troughs, with the troughs themselves, is of granite; the remainder of the stone being a fine grained article, extremely hard and of a delicate gray tint, which was quarried in Yorkshire. The carvings in the panels are emblematic of the nationalities of the United Kingdom; while the gargoyles and other figures represent some of the fantastic creations of Shakespeare, in "Mid-Summer Night's Dream." The monument was inaugurated in October last with appropriate ceremonies, the American minister and other notables being present.

Manual Training in Public Schools.

From a paper read by Prof. E. J. James at the late meeting of the American Association for the Advancement of Science we quote the following strong arguments in favor of adding manual training as a part of the course of instruction in the public schools:

The general introduction into our public schools of systematic training in the underlying principles of the handicrafts is the next great step in the development of our educational system. The adoption of this feature into our public education is demanded alike in the interest of sound intellectual training and by the economic condition of the country. The furnishing of facilities in connection with our public schools for manual training will accomplish four highly desirable results. It will give symmetry to a system which at present is notoriously one-sided and defective. The schools cannot be defended from the charge that their effort is chiefly devoted to training one side of the child—one set of its activities—to the exclusion of the others. Suppose the pupil who is graduated from our system of public schools must begin to earn his living on the day after graduation. What can he undertake? There are a number of vocations open to him, nearly all of which imply an existence of genteel poverty. He may enter a store as a clerk or bookkeeper, or an office as a copyist, or any one of a limited number of occupations in which an ability to write a fair hand and add a column of figures is the only necessary quality. In other words, our public schools are in a sense professional schools for these particular callings, and the result is that these callings are always overcrowded. The condition of things is much the same as if everybody went through a law school for the sake of a so-called liberal education. A system of manual training in the schools would open up to those who go through them the whole range of handicrafts as well as clerkships. Again, these industrial features, if introduced, would result in better attendance at the public schools. The percentage of children enrolled now, with all our expenditure of money, is less than it should be, and the attendance is often irregular. There is a reason for this. Take the case of the average laborer, with $1.50 to $2 a day, who has a boy of 10 years. The youngster has learned to read, write and cipher in a way in his three years of schooling. The question is now, Shall he continue in school or go into the shop? His going to school means to his father, mother, and brothers and sisters a serious sacrifice. They must eat less, wear less and enjoy less for his sake. Why should he go to school at all? If he goes into the shop he will begin to earn a trifle, and to learn a trade. In three or four years he will be self-supporting. In school he may learn a little more reading, writing and ciphering, and some geography, but he will come out, as far as making his living is concerned, just where he sta ted But experience has shown that such general manual training as can be given in connection with a school course to boys from 10 to 14 will put them forward as far as they could have pro ceeded if they had gone directly into the shops. The parent can see this, and there is little doubt that there would be a length ening of the school life of the great mass of children considerably—with great benefit to them and to the community. This manual school training will tend to remove the stigma from manual labor which in the minds of many still attaches to it. The fact is that the average boy or girl who remains in the public schools until the completion of the course is lost to manual callings, and many an excellent carpenter or machinist is thus ruined to make an indifferent bookkeeper or even lawyer or clergyman. Pupils now are never brought to associate intelligence and culture with manual labor. They are accustomed to connect the higher goods of life with the so called genteel occupations. Let them feel that in carpentering or plumbing or molding there is a field for intellectual qualities, for ingenuity and knowledge, and a perfect revolution will be effected in their attitude toward these things. Yoke intelligence and reflection to the homely cart of manual labor, and the interest of intelligent and reflecting boys will be arrested and permanently fixed.

Interior Decoration.

One of the most interesting and valuable books for the general library of an architect or a builder, and also useful to the house owner, that has recently come from the press, is the volume by Arnold W. Brunner and Thomas Tryon, a firm of well-known architects, and which has just been issued by William T. Comstock, of No. 23 Warren street, New York. The volume is a quarto, and contains some 65 pages of text matter with numerous illustrations, and, in addition, 15 full page plates. It is a model of typographical excellence, and the engravings, which have been reproduced from sketches by the authors, are of unusual merit. The scheme of the book is to take each of the principal divisions of a house and discuss it, introducing illustrations appropriate thereto. The general divisions of the book, therefore, are embraced under such heads as hall, staircase, library, parlor, dining-room, study and bedrooms. The illustrations in the text number no less than 50, and in quality compare favorably with the plate pages. We do not know that we can please our readers better in a review of this work than to present one or two engravings taken from it. The cut upon this page is the frontispiece of the book, and in the volume is entitled "Open Fireplace." The engraving on the page following is Plate II., and in the work is entitled "Corner in Hall." The volume is one that possesses great interest for buyers of architectural and art books.

Frontispiece, from "Interior Decoration."

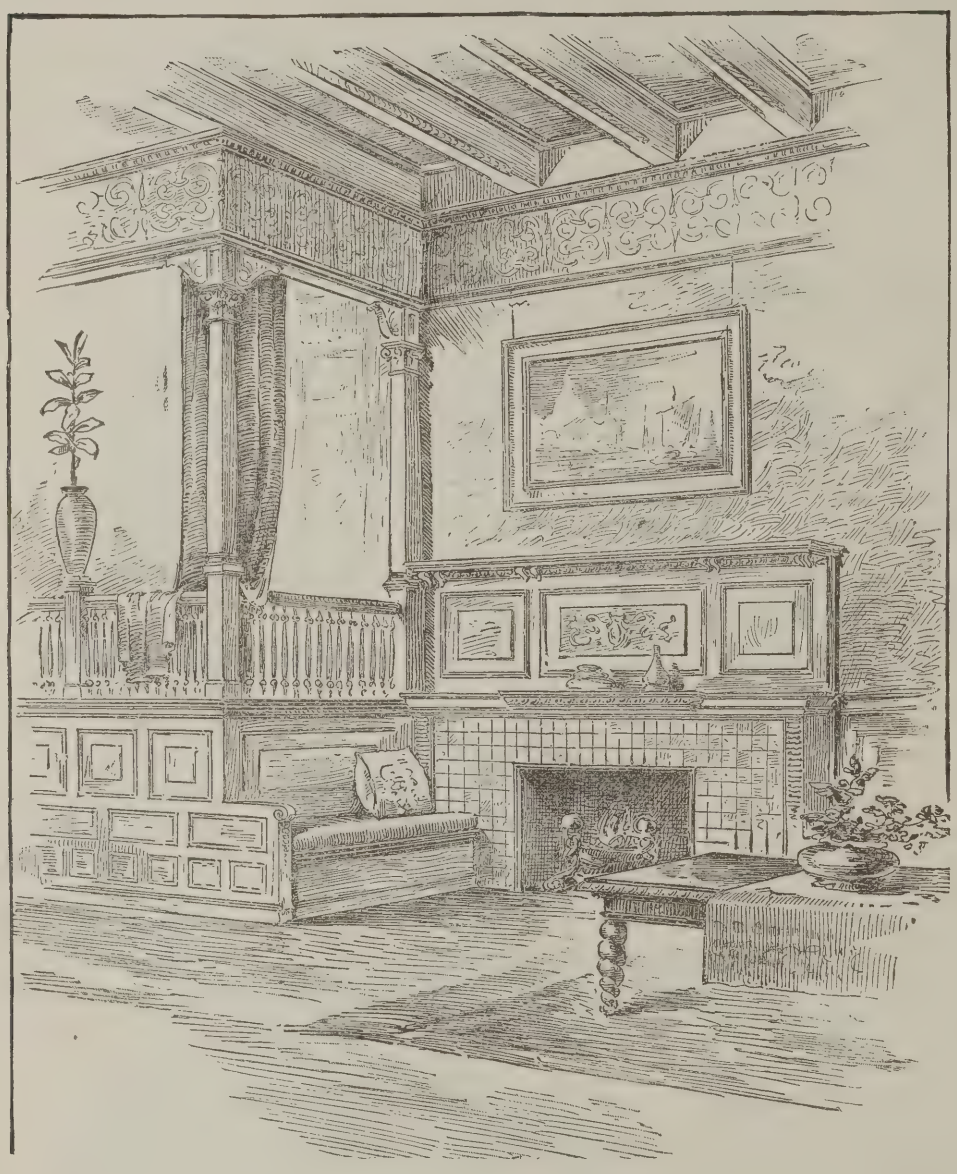
Louis Jochim, of Ottweiler, near Saarbruecken, Germany, is introducing paving blocks, which he calls iron brick. It is made by mixing equal parts of finely ground red argillaceous slate and finely ground clay, and adding 5 per cent. of iron ore. This mixture is moistened with a solution of 25 per cent. sulphate of iron, to which fine iron ore is added until it shows a consistency of

38° Baumé. It is then formed in a press, dried, dipped once more in a nearly concentrated solution of sulphate of iron and finely ground iron ore, and is baked in an oven for 48 hours in an oxidizing flame, and 24 hours in a reducing flame. The German Government testing laboratory for building materials has reported favorably on this brick.

Hardening Plaster-of-Paris.

For some time past there have appeared in these columns letters relating to means of working plaster-of-paris so as to secure certain specific results. A correspondent of the *English Mechanic* gives some information on the subject of hardening plaster-of-paris which may be of interest to our readers in this connection. He says:

Among the methods of hardening or toughening plaster-of-paris those recommended most frequently are the use of alum in the water or a decoction of marsh mal low. Some, however, use gum or glue, but in every case the plaster takes longer to set, and it will probably be found that the addition of a little sulphuric acid to the mixing water is all that is necessary. If a strong stucco is required, the plaster should be made into a *magma* with a solution of glue, which should not be concentrated. The mass requires a longer time to set than when pure water is used for mixing, but the mass becomes harder in the end. If the cast is to remain white, colorless glue or gelatine must be used. Regarding borax, various authorities differ in the proportions and method of its use. Thus one writer says that the crude pieces of burned gypsum should be saturated with a solution of borax, again burned for six hours, and then ground. A still better effect is said to be obtained with borated gypsum by making the *magma* for casting with the aid of a cold saturated solution of cream-of-tartar. Michaelis criticises the proportions of borax and cream-of-tartar quoted by others, inasmuch as they are directed in larger quantity than cold water would dissolve, while, on the other hand, gypsum should not be made into a *magma* with a hot solution. He therefore believes that if these additions are really useful cold saturated solutions would be all-sufficient. If burned gypsum in lumps is placed in a saturated solution of alum, afterward dried in the air, and again burned at as low a heat as possible, the resulting powder, particularly if mixed to a *magma* with a solution of alum, will yield very hard casts. The same result can probably be obtained by intimately mixing finely powdered plaster-of-paris with about 2 per cent. of burned alum, likewise in very fine powder, and making the *magma* with water. The addition to the water of a little solution of silicate of soda (not prepared from the thick or gelatinous variety, but from the clear, syrupy solution), will probably aid the setting. When a cast has been made the best way to harden it is to warm the cast to about 170° F., and then to quickly brush it over with a glass brush dipped in a hot saturated solution of caustic baryta, which must be carefully kept from the air until it is to be applied. The bartyra will sink into the pores of the external layer of the cast, absorb carbonic acid from the air and form carbonate of barium, which increases the density and hardness. A mixture of plaster-of-paris with powdered anhydrous borax would, perhaps, answer the purpose likewise. Possibly by taking a dilute solution of shellac and borax in water for making the *magma* a satisfactory result may also be obtained.



Corner Hall, from "Interior Decoration."

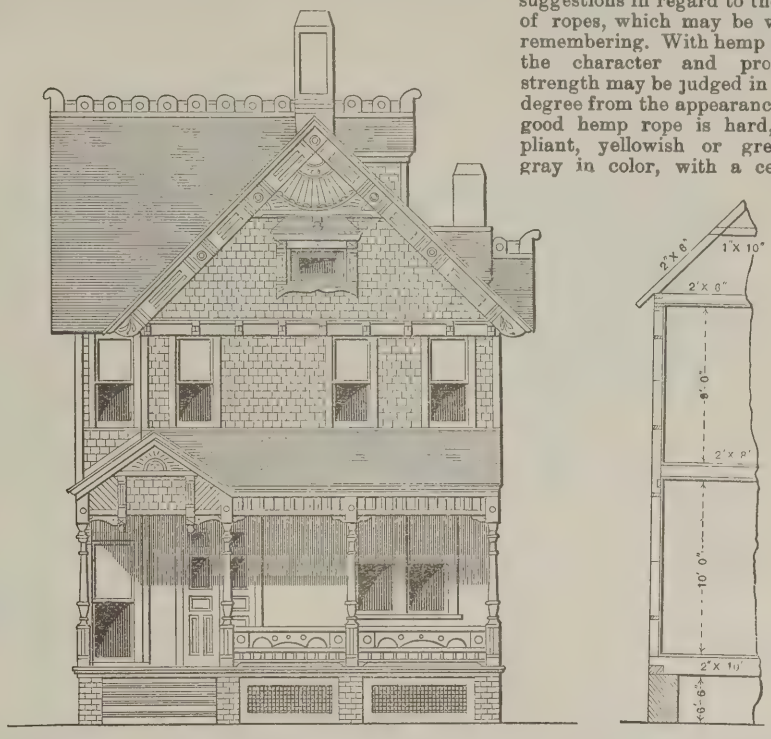
Why Water Puts Out Fire.

I have often been puzzled to answer for myself, writes B. B. James in a contemporary, why water extinguishes fire. A great many people say that it is because the water and its steam so completely envelop the burning material as to exclude oxygen, and thus the fire must stop. This seems to be an insufficient, if not entirely erroneous, reason. My reason is this: We know that nothing will burn (*i. e.*, unite with oxygen with the evolution of heat and light) unless and until it has been raised to a given temperature. Thus, sodium burns at ordinary temperatures—about 60° if dry—the gas of ordinary kerosene at about 170° or less, and so on. Why do we tip a piece of stick with sulphur and then with phosphorus to make matches? Because, while wood must have quite a high temperature, phosphorus will burn at a comparatively low temperature—so low that the heat developed by slight friction will ignite it. The phosphorus makes heat enough to ignite the sulphur, but not enough to start the wood. The sulphur in burning makes heat enough to ignite the wood. But I will ask another question: Wood ashes are white. Why is the remaining end of the match, and often most of it, black in color? Is it not because carbon being black, and the wood being composed of carbon and compound substances, which are very inflammable, the latter burn, but, this generally answering our purpose, do not generate enough heat to oxidize the former? This seems to me the reason, the carbon remaining. Thus premising, and showing that carbon, which forms the bulk of wood (as well as of paper, cotton, &c.), requires to be very hot before it will unite with the oxygen, we may consider the water for a moment. Perhaps the easiest way to make my point clear is to take a common illustration. Every one knows that if one puts a kettle of water on a heated stove he must wait a long time for it to become boiling hot, or a temperature of 212° F. Now, if he should put the same amount of quicksilver on by the side of the water, the latter would reach 212° far sooner. Why is this? It is because the water takes up a large amount of heat which is there in the water, but which the thermometer does not index. Now if, after reaching 212°, he sets them off the mercury will reach the temperature of the surrounding air much more rapidly. Now, suppose he wished to boil all the water away, to evaporate it; in that case, remembering that in passing from water to steam the temperature is not raised even a degree, nor any fraction of one, could he not make it all evaporate instantly by raising the temperature a little? We all know he could not, that the fire has a degree of heat several hundred degrees higher, but the kettle must remain a long time, while the water very gradually goes off as steam. Why so? Because the water in becoming steam must take into itself a large amount of heat not shown by the thermometer, and as the heat can be added only gradually the formation of steam is slow. Now, in the large amount of heat which water can take up, and the fact that ordinary inflammables must be raised to a high tem-

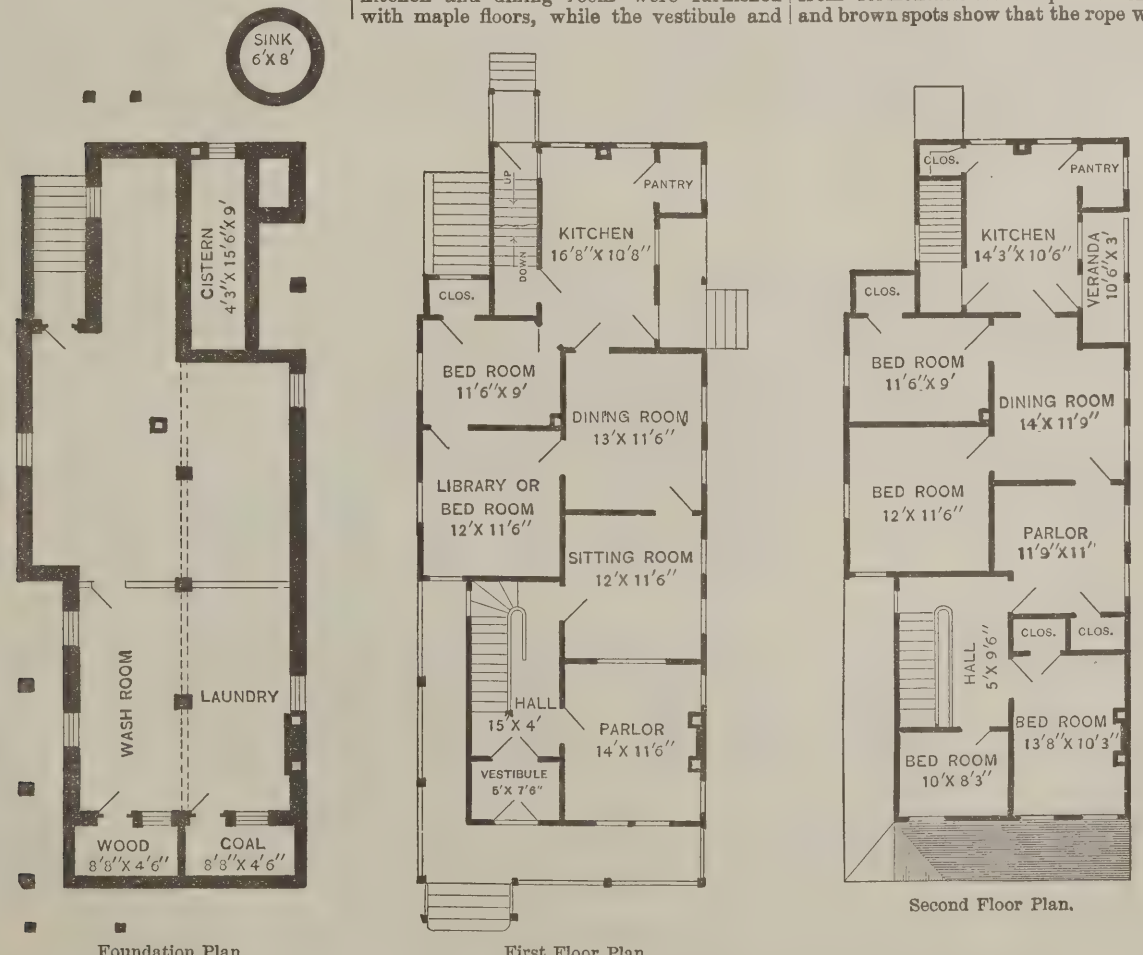
perature in order to burn, we have the cause of water putting out a fire. Put a burning match into a very small drop of water and it is extinguished, because of the very large amount of heat taken from the match in reducing the water to steam, which reduces the temperature of the match to far below 212° or at least that far, if there is water enough, and so the carbon and its compounds forming the wood will no longer unite with the oxygen of the air. For the same reason a hot iron thrust into water is cooled, and water sprinkled on the floor cools the air, the heat of evaporation in the latter case coming from the air itself, thus cooling it. Now, if we could find a fluid very plentiful which requires much more heat than water to make it boil, evidently we could put large fires out much more readily.

Plans for a Double House.

The accompanying elevations, plans and details show the features of a residence built for Mr. Thomas H. Maloney, Scranton, Pa., a short time since, to plans prepared by J. P. Reddington, whose present address is 68 Eagle street, Albany, N. Y. The special features of the plan to which the architect directs attention are the adaptability of the structure for use by two families; and yet its ready conversion into a single house whenever such a change is desired. The cost of the house is given as $2800. Referring to the engravings, the author of the design says that the outside of the building was left as plain and as devoid of expensive and useless ornamental features as possible. At the same time, he states, he has striven to have it in keeping with its surroundings. By referrence to the floor plans, it will be seen that each floor accommodates a family; and yet one family might occupy the entire house without expensive alterations. Frames are set in the partition separating the different rooms, and so arranged that such additional doors as are necessary can be put in at this point at any time. The arrangement, we are assured by the author, has given entire satisfaction, and has achieved the measure of popularity of being copied by several other persons who have since built. The stairs, we are informed, were finished in cherry; also the newel, rail and balustrade. The rooms throughout are supplied with molded base boards, casings and corner blocks, all done in Georgia pine, oiled. The kitchen and dining room were furnished with maple floors, while the vestibule and hall floors are laid in walnut and ash. The stoops are ceiled with yellow pine, oiled. All the walls are finished in hard plaster, three-coat work. A few of the details of this building are presented herewith.



Front Elevation and Section of House for T. H. Maloney, Scranton, Pa.
J. P. Reddington, Architect.—Scale, ⅛ Inch to the Foot.



Foundation Plan. First Floor Plan. Second Floor Plan.

Floor Plans of House by J. P. Reddington.—Scale, $\frac{1}{16}$ Inch to the Foot.

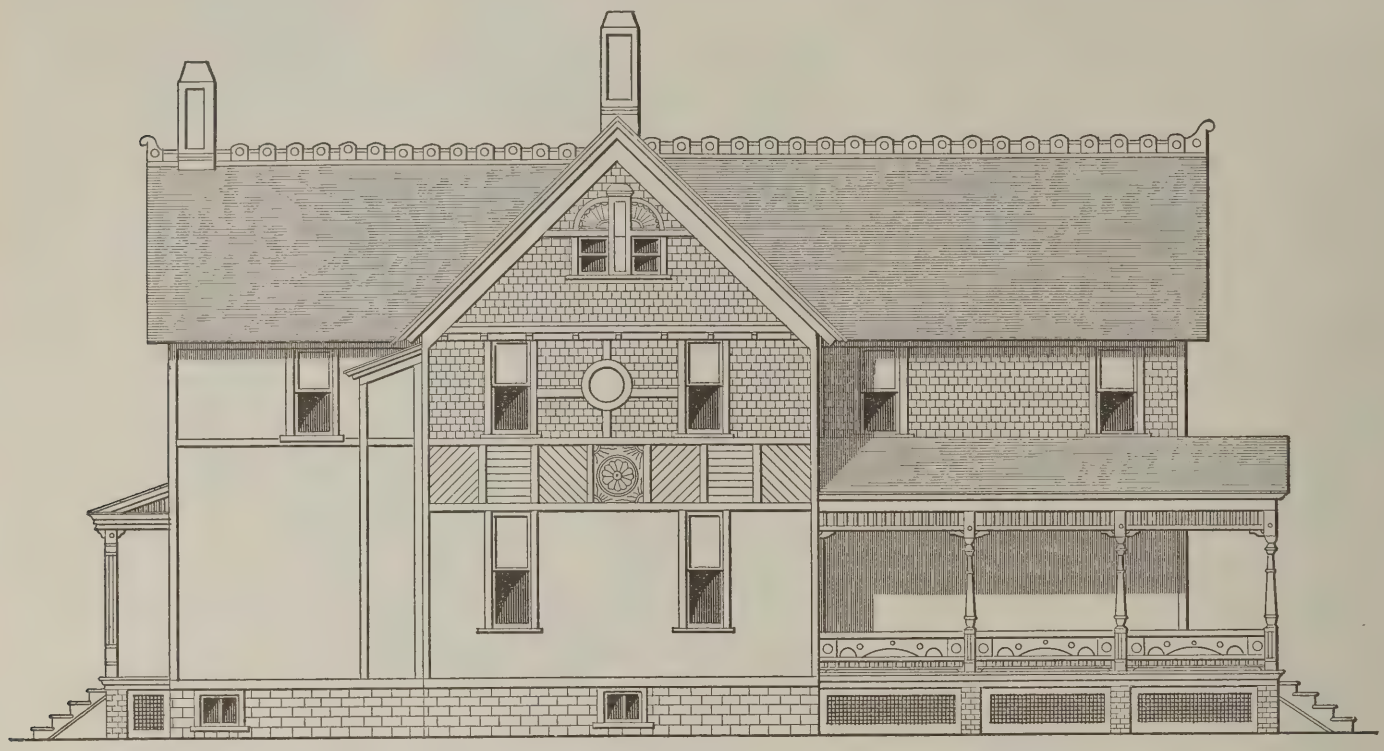
Ropes and Their Uses.

According to the *American Architect*, the *Bautechnische Zeitung* gives some practical suggestions in regard to the use of ropes, which may be worth remembering. With hemp ropes the character and probable strength may be judged in some degree from the appearance. A good hemp rope is hard, but pliant, yellowish or greenish gray in color, with a certain silvery or pearly luster. A dark or blackish color indicates that the hemp has suffered from fermentation in the process of curing, and brown spots show that the rope was spun while the fibers were damp, and is consequently weak and soft in those places. Sometimes a rope is made with inferior hemp on the inside, covered with yarns of good material; but this fraud can be detected by dissecting a

portion of the rope, or, in practiced hands, by its behavior in use. Other inferior ropes are made with short fibers, or with strands of unequal strength or unevenly spun. In the first case the rope appears woolly, from the number of ends of fibers projecting, and in the latter the irregularity of manufacture can be seen by inspection. Occasionally a hemp rope is spun with a core or central strand, such as is used in the interior of many wire ropes. This somewhat increases the strength, but the core, shut in by the outside strands, is liable to rot and infect the rest, and any rope with a musty, moldy smell should be rejected.

The best hemp comes from Russia, Switzerland, Alsace and Northern Italy, and it is said that the strongest fibers are obtained from plants grown at the foot of high mountains. Ropes to be used on board ship, or where they are liable to be often wet, are usually soaked in tar to preserve them, but the tarring diminishes the strength by about one-third, and increases the friction of the rope. The injurious action of tar upon the hemp fibers seems not to be clearly explained, but it is said to be lessened by subjecting the tar, before applying it to the rope, to repeated melting and washing with water The effect on a rope of soaking with water is, however, worse than that of saturating with tar. According to accurate experiments, the tensile strength of a wet rope is only about one-third that of the same rope in a dry condition, and a rope treated with grease or soap is weaker still, apparently through the influence of the lubricant in facilitating the slipping of the fibers.

It should never be forgotten that hemp cords contract strongly on being wet, a dry rope 25 feet long shortening to 24 feet or less when dipped in water or exposed to heavy rain. Every one remembers the story of the raising of the obelisk in Rome, when proclamation had been made that any one who spoke during the critical operation should suffer death, and how, when the obelisk had been raised nearly to its place, and the hoisting-cables had begun to stretch and threatened to let the stone fall, a by-stander shouted, "Wet the ropes," and his advice was taken, and the obelisk drawn safely into place by the contraction of the fibers, while the author of the suggestion was being dragged away to execution; and apocryphal as the tale probably is, it may have had a certain foundation in some op-



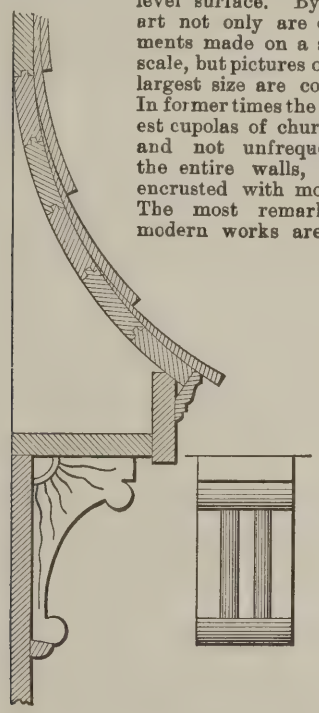
House Built for T. H. Maloney, Scranton, Pa.—Left Side Elevation.—Scale, ⅛ Inch to the Foot.

Right Side Elevation of T. H. Maloney's House.—Scale, ⅛ Inch to the Foot.

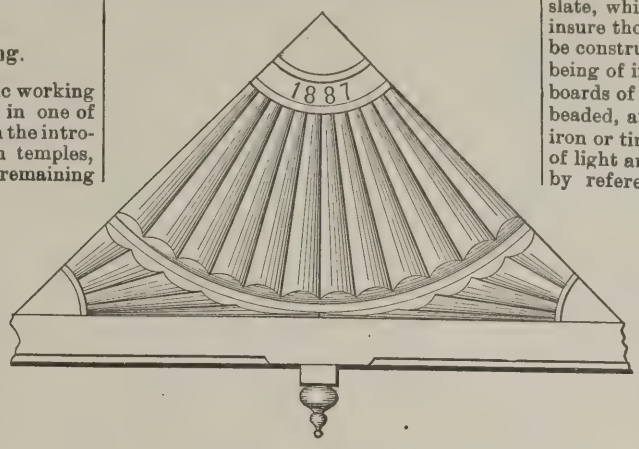
portune use of a property of hemp cordage which often causes loss and annoyance to builders who leave tightly stretched ropes exposed to rain or dew.

Ancient Mosaic Working.

Writing on the subject of mosaic working among the Romans, C. H. Wilson, in one of our English exchanges, says: "On the introduction of pictures into Christian temples, they were first made of mosaic; remaining specimens of these are rude, but profoundly interesting in a historical point of view. When art was restored in Italy, mosaic also was improved, but it attained its greatest perfection in the last and present century. Roman mosaic, as now practiced, may be described as being the production of pictures by connecting together numerous minute pieces of colored marble or artificial stones. These are attached to a ground of copper by means of a strong cement of gum mastic and other materials, and are afterward ground and polished as a stone would be to a perfectly level surface. By this art not only are ornaments made on a small scale, but pictures of the largest size are copied. In former times the largest cupolas of churches, and not unfrequently the entire walls, were encrusted with mosaic. The most remarkable modern works are the copies which have been executed of some of the most important works of the great masters for the altars in St. Peter's. These are in every respect perfect imitations of the originals; and when the originals, in spite of every care, must change and perish these mosaics will still convey to distant ages a perfect idea of the triumphs of art achieved in the fifteenth century. The Government manufactory in Rome occupies the apartments in the Vatican which were used as offices of the Inquisition. Cases of *smalti* are shown containing, it is said, 18,000 different tints Twenty years were employed in making one of the copies I have mentioned. The pieces of mosaic vary in size from ⅛ to ¼ inch, and 11 men were employed for that time on each picture. A great improvement was introduced into the art in 1775 by the Signor Raffaelli, who thought of preparing the *smalti* in what may be termed fine threads. The pastes, or *smalti*, are manufactured at Venice in the shape of crayons, or like sticks of sealing-wax, and are afterward drawn out by the workman at a blow-pipe into the thickness he requires, often almost to a hair, and now seldom thicker than the finest grass stalk. For tables and large articles, of course, the pieces are thicker; but the beauty of the workmanship, the soft gradation of the tints and the cost depend upon the minuteness of the pieces and the skill displayed by the artist. A ruin, a group of flowers or figures, will employ a good artist about two months when only 2 inches square, and a specimen of such a description costs from £5 to £20, according to the execution; a landscape 6 inches by 4 would require 18 months, and would cost from £40 to £50. This will strike you as no adequate remuneration for the time bestowed. The finest ornaments for a lady, consisting of necklace, earrings and brooch, cost £40. For a picture of Paestum 8 feet long and 20 inches broad, on which four men were occupied for three years, £1000 sterling were asked."



House Built for T. H. Maloney, Scranton, Pa.—Section Through Cornice Over Front Gable.—Scale, 1½ Inch to the Foot.



Carving in Front Gable.—Scale, ½ Inch to the Foot.

Turnings in Stoop.—Scale, 1½ Inch to the Foot.

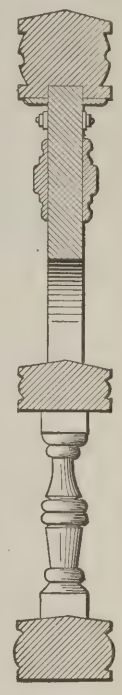
New York Public School Sanitation.

The problem of school sanitation is one which appears to be difficult of solution, owing in a great measure to the fact of so many questions being involved in its consideration. The first and principal one is, of course, how best to secure the removal of soil and waste matter in the least offensive manner, and which has hitherto been attempted to be done by means of the school sink, but this appliance has evidently not given satisfaction, and something better is now needed. The next consideration is how to get over the difficulty of imparting sufficient warmth to the atmosphere of the building in which the closets are situated, so as to lessen the danger consequent on the transition from the classroom, heated to at least 70°, to the closet building in the yard, where the temperature is little, if any, above that of the outer air, without at the same time rendering it otherwise unpleasant.

Both of these, which are the principal difficulties, are in a fair way of being removed by means of a carefully devised plan of sanitation, presented by Mr. Geo. W. Debevoise, Superintendent of School Buildings in this city, to the Health Department, and by that body approved and adopted at a recent meeting. It is a comprehensive plan also in the fullest sense, for every detail has been thoughtfully worked out, as will be readily inferred by a reference to the diagrams shown in the large plate page herewith, which present an outline of the main features of the new system. A general impression, however, is all that can be conveyed at this stage, for doubtless there will be many things which will readily suggest themselves as the work progresses which cannot be brought forward here, but it is expected that it will in a great measure (if not wholly) provide what is necessary in the way of securing, so far as circumstances call for, the health and comfort of the children attending the schools, and which will be readily appreciated by parents and pupils alike.

Fig. 1 (see Plates XLVI and XLVII) shows the elevation front and rear of the proposed closet building. The side walls will be of brick faced on the inside with enameled brick, or the same effect produced by the application to the walls of some effective enameling material. The floor is to be entirely of slate, which will admit of daily flushing and insure thorough cleanliness. The roof will be constructed of iron and wood, the rafters being of iron on which will be laid narrow boards of yellow pine tongued, grooved and beaded, and covered with either corrugated iron or tin. That there will be abundance of light and ventilation will readily be seen by reference to the diagram showing the windows and ventilators in the roof.

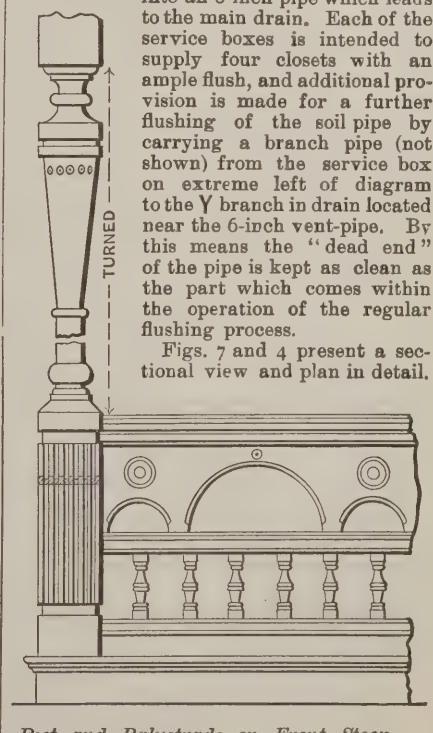
In Fig. 5 will be seen the end section, showing distance from the schoolhouse proper, with vent-pipe connection into a heated flue, which is intended to carry off all offensive odors and insure a healthy atmosphere within the building. Fig. 9 presents a sectional view of the arrangements of the closet seats and the service boxes, as also the connection with the main drain, the vent-pipes, &c. It needs but little description. The closets are of the hopper pattern and discharge into the main drain through 4-inch pipes, and each drain is vented by means of a 6-inch vent-pipe (indicated on diagram) carried above the school and alongside of the hot-air flue, into which the 12-inch vent-pipe (referred to in Fig. 5) is carried. The provision for the thorough ventilation of soil and drain pipes, and the building generally, is shown on this diagram, and will be readily comprehended.



Section Through Rail on Front Stoop.—Scale, 1½ Inch to the Foot.

Fig. 2 shows a longitudinal section with service boxes in position and the general operation of the system. The closets, which are set in a double row back to back, discharge into an 8-inch pipe which leads to the main drain. Each of the service boxes is intended to supply four closets with an ample flush, and additional provision is made for a further flushing of the soil pipe by carrying a branch pipe (not shown) from the service box on extreme left of diagram to the Y branch in drain located near the 6-inch vent-pipe. By this means the "dead end" of the pipe is kept as clean as the part which comes within the operation of the regular flushing process.

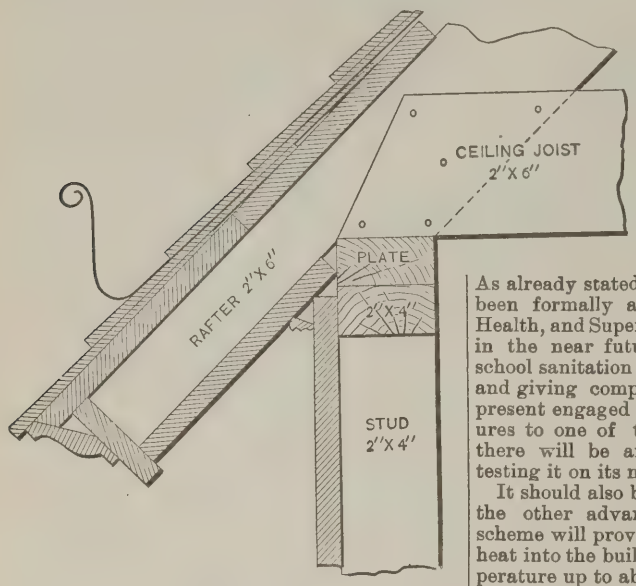
Figs. 7 and 4 present a sectional view and plan in detail.



Post and Balustrade on Front Stoop.—Scale, ½ Inch to the Foot.

On the left-hand side is the closet, and on the right the urinal. The closet compartments are separated by yellow pine partitions, while those of the urinal are of slate

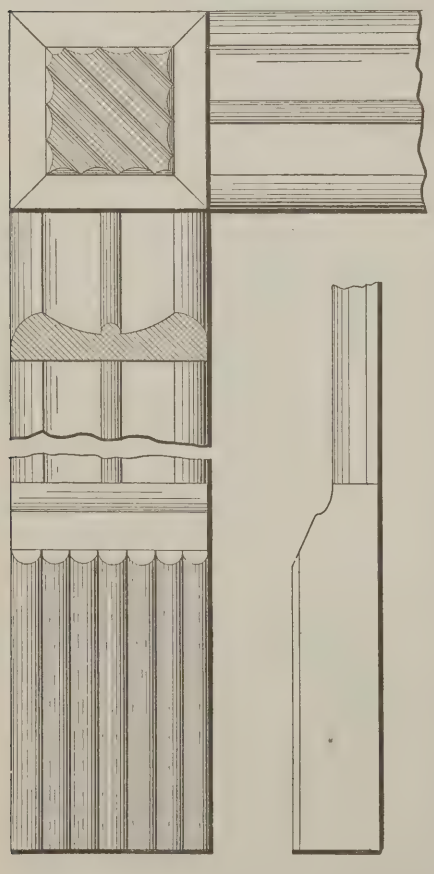
with a backing of glass from the floor to the extreme hight of the main partition. This is considered a necessary preventive measure, as competition among boys of a certain age is by no means confined during school hours to the classroom and the



House Built for T. H. Maloney, Scranton, Pa.—Cornice.—Scale, 1½ Inch to the Foot.

school yard. Beneath the urinal an inclined drip, composed of slate, is so arranged as to carry away whatever falls outside the urinal trough. This is indicated, both under the urinal and at foot of the diagram, by the line marked *a*, and its purpose can be readily understood.

Fig. 3 shows a section of a double urinal with slate partitions, and Fig. 6 the inclined drip *a*, already referred to on the



Detail of Door Trim.—Scale, 3 Inches to the Foot.

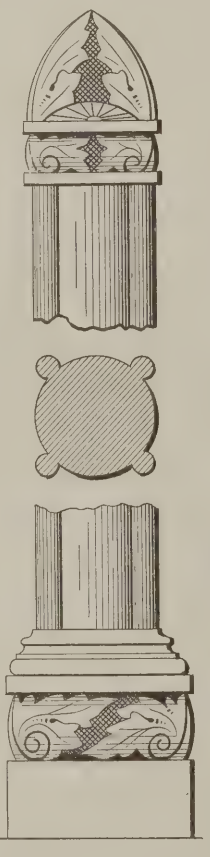
partitions. The circles indicated thus ⁰₀ represent the position of iron binding rods passing through the entire series and enabling them to withstand the rough usage to which the exuberant spirits of the youth of the period, as a general thing, are certain to expose them.

Fig. 8 shows elevation of cast-iron enameled urinal trough, with the connections to soil-pipe, the drip connection and the flush-pipe at top. The waste-pipe from the urinal is 4 inches, while the 3-inch pipe carries away the drip and the water used for cleansing the floor. The flush-pipe along the top of the partition is continued down, and used to thoroughly flush the trough, and at stated intervals, also, an automatic flush of the glass backs takes place, which keeps the entire apparatus in a cleanly condition. As already stated, the plan here outlined has been formally approved by the Board of Health, and Superintendent Debevoise hopes, in the near future, to have his system of school sanitation in thorough working order and giving complete satisfaction. He is at present engaged in adapting its leading features to one of the uptown schools, when there will be an opportunity afforded of testing it on its merits.

It should also be noted that in addition to the other advantages presented the new scheme will provide for the introduction of heat into the building so as to bring the temperature up to about 60° F. By this means much of the danger to the health of the children by the change from the warm classroom to the cold closet will be avoided.

Salt As a Building Material.

The *American Architect and Building News* directs attention to the use of salt as a building material. Our contemporary, after asserting that common salt is found useful in many ways, continues: Among the carpenters salt is now found to be useful as an aid to the heating of glue. Where, as is usual in joiners' and cabinet-makers' shops, the glue is melted in a jacket-kettle, surrounded by water, it is said to be advisable to put salt in the water in the outer kettle. The addition of salt raises the boiling point, and, therefore, allows the glue in the kettle to be kept at a higher temperature than could be maintained with water alone, and this is advantageous to the work. The masons find their use for salt in adding it to cement mortar in cold weather to preserve it from the bad effects of freezing. It is not quite clear why the salt should act in this way, as the beneficial results of using it are visible with mortar which has certainly been frozen, and frozen salt water expands nearly as much as fresh water; but engineers and contractors who have tried it are unanimous in their opinion as to its value. In many cases masonry has been laid in cement in cold weather, using a considerable proportion of salt in the mixture, which, after repeated freezings and thawings, has remained in perfect condition, while work near by laid in mortar of the same kind, but without salt, has been disintegrated by the frost.



Newel in Front Hall.—Scale, 1 Inch to Foot.

Roofing Notes.

Natural Asphalt Roofing.

The use of asphalt for roofing purposes is by no means new, although it is probably not so well known as its durability and other good qualities would warrant. A short time since we had the opportunity of inspecting the laying of a large quantity of asphalt roofing by the Warren Chemical and Mfg. Company, of 114 John street, New York, on the building of the Goodyear Rubber Shoe Company, at Naugatuck, Conn., and previously of observing the process of the manufacture of the material at the company's works, at Hunter's Point, Long Island. This company, we are informed, were the first to employ asphalt for roofing purposes and their process of manufacture, which has undergone steady improvement since the beginning, has now reached a degree of perfection which makes it of much interest. The manufacture of asphalt both for the purpose of paving and roofing, although simple, is carried out with great care. The process consists practically of nothing more than that of refining. As received from Trinidad, the crude substance contains about 30 per cent. of water and from 5 to 7 per cent. of earthy matter. The immediate object of the process is to get rid of these two constituents and leave the clear bitumen. This, however, would be too hard for ordinary purposes and a non-volatile oil, which does not vaporize under from 800° to 830°, is mixed with it in certain proportions, which makes it sufficiently soft, while rendering it of a character to be unaffected by the heat of the sun. The crude asphalt is of a dark brown color, somewhat brittle, although possessing a certain elasticity. It is broken up and placed in tanks heated to a temperature of 212° F. Here it gradually melts, the earthy residuum being precipitated while the moisture becomes vaporized. The unmelted portion is lighter than that which is melted, and, therefore, floats, and does not mix with the residuum at the bottom of the tank. The process is well calculated to obtain the pure bitumen and retain the natural oils. When the asphalt is melted the heat in the air chamber is gradually raised to about 350° F., and the non-volatile oil already mentioned is then introduced into the tank. To produce a thorough incorporation between the oil and the asphalt, the mixture is then violently agitated for about five hours by means of air pumped with force into the bottom of the containing chamber. The process occupies about eight days and eight nights for its completion, and at the conclusion the asphalt is passed through a wire strainer for the purpose of removing twigs and other small impurities which it contains. It is then in a condition to be used for roofing purposes, and is run off into barrels where it hardens.

The asphalt to be used for saturating the felt is heated and thinned down by the addition of the same non-volatile oil as that used in the purifying process. The means of saturating felt with asphalt, with coal tar and with pitch are very similar, the only essential difference being that the former is heated to about three times the temperature of the latter. The felt employed is made of woolen rags, paper, straw, jute and other materials or a mixture of them, according to the quality. A specially constructed machine is employed by which the felt is unrolled and immersed in lengths in a trough containing the asphalt or tar. Here it remains for a period long enough to allow the asphalt to penetrate it, which it usually does in a few seconds, the felt being quite porous. When asphalt is the saturating material the felt is taken by means of rollers on to a rack some 50 feet long, where it returns back and forth some four or five times before it is rolled up, the object being to give it an opportunity to cool. To prevent it sticking together when rolled up the surface is covered with white sand. When two-ply or three-ply felt or thicker is made it is formed by causing the layers to adhere by using the asphalt as a cement. This is done in a machine which spreads the cement uniformly over the surface and presses the layers to-

gether in as many thicknesses as may be required to be used.

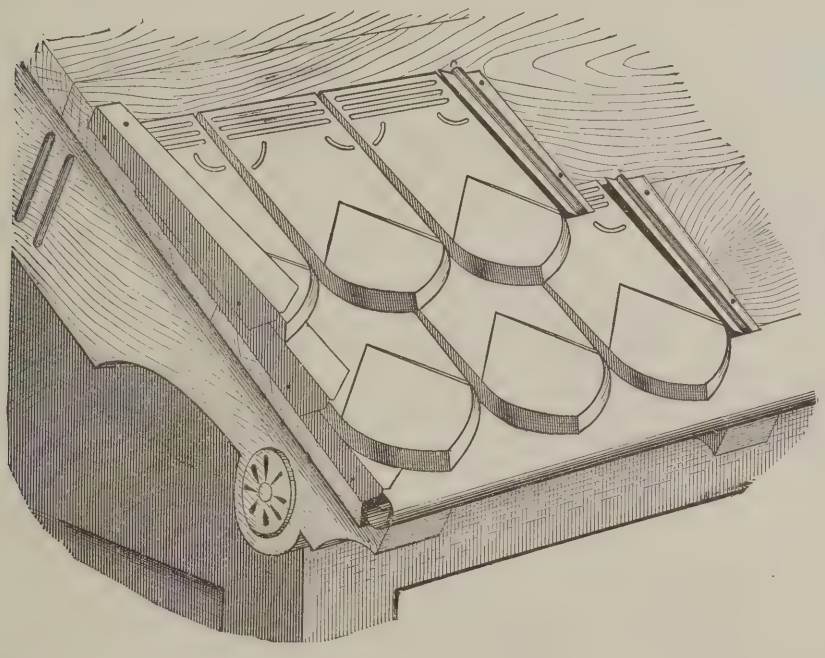
The method of laying an asphalt roof is almost identical with that of other roofs, the essential difference being in the material used. On the Goodyear Rubber Shoe Company's works, to which reference has already been made, the roofs were commenced by first placing a strip of the double felt on the eaves, and nailing it thereto through raised convex disks placed at distances apart of about one foot. The next strip of felt was lapped over the first one rather more than one-half its width, and the whole roof was laid with this two-ply felt in the same way, making four ply in all. The next layer of "Composite" felt was put down in the same way, only that asphalt cement was used between them, being spread with a mop. "Composite" felt is a new article, designed to take the place of the ordinary tarred felt for roof foundations. It is composed of one sheet of best manila paper, and one of saturated roofing felt cemented together by a continuous layer of pitch or asphalt, as in the ordinary two ply felt. It is claimed to be many times stronger than the best brands of tar or felt, and to combine the advantages of a two ply felt with lightness and pliability. Besides being the best felt for the ordinary roof, it is especially useful in cases where the felt is constantly exposed to moisture from below, the manila rope paper side being next to the roof boards as a sheathing and the waterproof cement preventing the penetration of the moisture.

A final layer of felt was placed on top of this, making six plys in all, and cement was then placed over the surface by means of a ladle. Gravel was immediately strewed upon the cement, to which it firmly adhered. About 5 gallons of cement per square was used for the mopping, and about 6 to 7 gallons for the top coat of asphalt. The gravel was delivered in small bags containing about 7 pounds each, and seven of these bags were required to the square. Copper cleats were placed on all the eaves and copper flashings employed around all openings. The extent of the building covered in the manner described is about three hundred squares, and the whole job appears to have been most satisfactorily executed.

The advantages of asphalt over ordinary coal-tar are claimed by the Warren Company to be of a decided and important nature. The construction of a roof does not, as it has already been remarked, materially differ from ordinary coal-tar roofs, but to the difference of material may be attributed the increased strength and durability which is claimed for asphalt roofs. Coal-tar, the company admit, is an excellent material for many purposes, but for use in situations where it is exposed to the action of the sun, whether as felt or in a cement, it is subjected to the great objection of losing one of its most valuable properties—namely, that of elasticity. All coal-tar oils, they say, are volatile, and will vaporize under the influence of the sun, and the consequence is that, when they are used either for the purpose of roofing or paving, after a comparatively short time, the oil being gone, the pitchy residuum is brittle. The pavement in this condition will crumble under the feet, while on a roof, it is equally objectionable. A roof is, of course, much exposed to the action of the weather, and is liable to constant contraction and expansion by the variations in temperature. It may be said that to properly deal with these changes is the most essential thing in a successful formation of all roof coverings. The effect of contraction in the case of both coal-tar and asphalt is to cause them to split into minute cracks, but they readily join together again on the material expanding. When, however, the oil has departed from coal-tar it no longer has the property of rejoining. Asphalt roofing merits the serious consideration of roofers in general, particularly in view of the length of time it is claimed to last and the price at which it is furnished.

New Queen Anne Shingle.

The National Sheet Metal Roofing Company, 510 East Twentieth St., New York, are just putting upon the market a new pattern of the Queen Anne shingle which they are manufacturing that will command the attention of many of our readers. The device retains the constructive features of the original shingle of this series, but embodies a different design, as is here shown, in combination with certain improvements which practice has suggested to the company to use in connection with it. An eave strip for starting the roof is shown, consisting of a plain piece of sheet metal on which a bead is turned, the same as is used in forming gutters. Along the verge board some angle flashing pieces are used, which combine with the shingles in a way to form a finish at the edge and to facilitate the use of the half shingles which are necessary to complete the pattern. A leading feature to which the makers direct attention in this shingle is the fact that the lock-joint between adjacent shingles is so located as to be sunken below the surface of the shingle. The different courses overlap on a flat surface, and the appearance of a roof is therefore everything that can be wished. The shingles, it will be noticed, assume a form that may be described as architectural, and which resembles styles in which tile and slate have been worked for many years past.



New Queen Anne Shingle.

Items.

THE TOTAL COST of the Franklin County Court House (Columbus, Ohio), as given in the report of the secretary of the commission, was in the neighborhood of $450,000. Of this the slate and copper work amounted, in round figures, to $14,000; the tin and galvanized iron work to $20,000. These contracts were executed by W. R. Kinnear & Co., of Columbus. The building is massive in general appearance, with features which command the attention of even the most casual observer. It is modern in design and construction and is ample in all its parts and well located as to light and air. The contrast between the new building and the old Court House, which it supersedes, illustrates in a marked manner the ideas and needs of the community at the present time and 100 years ago.

THE CAMBRIDGE ROOFING COMPANY, Cambridge, Ohio, report that they are having a large trade this fall in their Crowl's Patent Iron Roofing. In order to keep pace with their orders they are working nights. The roof that they are manufacturing has become very popular with the building trade, and is in demand in many different parts of the country.

JAMES B. SCOTT & CO., of Pittsburgh, forward for our inspection a unique testimonial with reference to the quality and character of their Duquesne Guaranteed Roofing Plates. The testimonial is in the form of a piece of tin cut from a roof which had been in use some two years. The roof in question is on a building in New Comerstown, and was laid by Mr. Crater. The roof was never painted, and accordingly the metal has had no protection except simply that afforded by the coating originally supplied. The piece of metal is in excellent condition without any appearance of rust, although it is somewhat discolored by the weather, and probably also by coal soot, as it is blackish. The thickness of the coating is easily verified by cutting into the surface with a pen-knife. Referring to this specimen our correspondents say that they have had many testimonials of a high character, and add, "but we confess that nothing so emphatic as the present one has been received. It outlines, we believe, an experience unprecedented with any plate that is not hand dipped.'

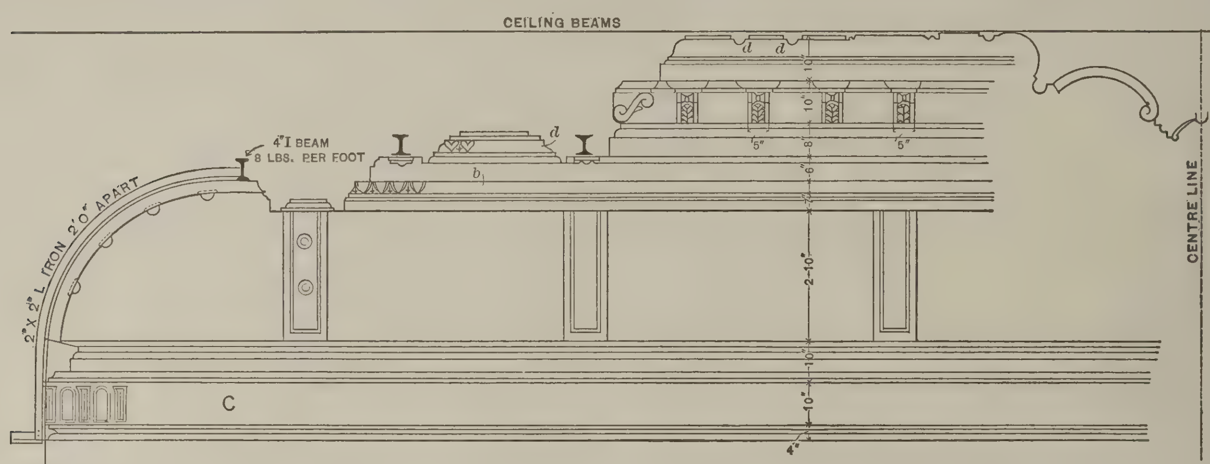
ONE OF THE HANDSOMEST business structures on Sixth avenue, New York, erected the present year, is the new dry goods store known as O'Neil's. It occupies the entire block from Twentieth to Twenty first streets. The architect is M. C. Merritt. A circular tower occupies each corner and a pediment forms the center of the front. The towers are 20 feet in diameter, and are ornamented with panels about the base. Very handsome scroll work emphasizes the panels beneath the pediment in the center of the front. The galvanized-iron work of this job, which is a conspicuous portion of it, was furnished by John Neil, of West Sixteenth street, New York. J. T. Wagner, the New York sales agent for Bakewell & Mullins, supplied the ornaments.

JAMES WHITE, one of the best known roofers and cornice manufacturers of Brooklyn, N. Y., has recently secured the rights, under the Vulcan Company, of Philadelphia, Pa., for the improved steam-power machinery which they control. This machinery is at present in successful use in Boston, Philadelphia, Pittsburgh, Salem, St. Paul, Chicago, St. Louis, Buffalo, Cleveland and other points. We understand that Mr. White contemplates an important addition to his factory, and that when his present schemes are completed he will have one of the finest and best appointed establishments in the country devoted to this line of trade.

WE LEARN that the commssioners for the building of the West Tennessee Hospital for the Insane at Bolivar, Tenn., have decided to use Alderly roofing plates, sold by Gummey, Spering, Ingram & Co., Philadelphia, for the covering of the building. The selection was made from four plates named in the specification and tests insituted in order to determine which was most satisfactory. The contract, we are informed, requires over 1000 boxes of roofing plates.

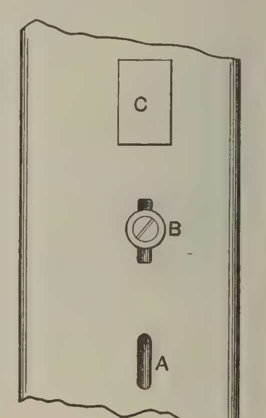
Sheet-Metal Ceiling Work.

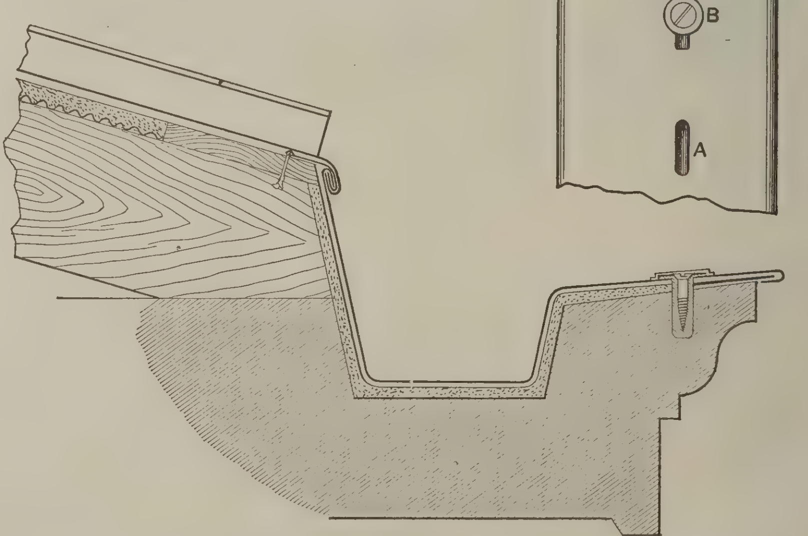
We have already mentioned in these columns that the sheet-metal ceilings of the new courthouse, Columbus, Ohio, are done in sheet metal. The work was executed by W. R. Kinnear & Co., of Columbus, Ohio, and is quite elaborate in character. The engravings in Plate XLV, which have been made from photographs taken since the work was in place, give an idea of its char acter, while the diagram presented on this page shows the plan of construction and how it is held in place. By close scrutiny of the engravings, which are very correct reproductions of the photographs, it will be noticed that relief ornamentation has been combined with painted patterns, so that it is somewhat difficult to tell which is in relief and which is flat. There are six court-rooms in the building, the ceilings of all of which are done in galvanized iron ornamented with pressed zinc work. So far as the photographs have been laid before us, the work is of the same general grade or character, although there are variations in design as between the different rooms. The iron throughout, we are informed, is of 26 gauge and the ceiling in each case is suspended from iron beams above. The appearance of the work is very creditable to the constructors, particularly in point of straight lines and concealed joints. The surface is said to be free from buckles. The detail drawing already referred to shows the position of the I-beams, which were placed at proper points below the ceiling beams, in order to form a support for the coffers. The margin of each room is finished by a cove, the shape of which is clearly shown in the drawing referred to.



Sheet-Metal Ceiling Work,—Section Showing Construction of Sheet-Metal Ceiling in New Court House, Columbus, Ohio.

The second detail presented on this page is of interest in this connection, but refers to the outside work on the same contract and not to the interior. The main cornice of the building is of stone. The gutter was cut in this in the usual form, and part of the contract in question was lining it with copper. The drawing referred to shows a section through the cornice and indicates the form of the gutter and shows how the work was managed. The copper used was tinned on both sides. The gutter was first lined with ½ inch of asbestos, which was troweled smooth and allowed to harden, after which the copper was put in place over it. A strap iron which was fastened to the stone by appropriate means was allowed to project forward over the edge of the cornice, and the outer edge of the gutter was hooked over it, as clearly shown in the engraving. To allow for expansion and contraction lengthwise, an elongated slot 2¾ inches long by ¼ inch wide was cut in the copper, as indicated by A in the plan view above the section. Through this slot into plugs, put at appropriate points in the stone cornice, screws were driven, washers being put under the heads of the screws, as indicated by B, and over all a cap, shown in the drawing at C, was soldered. The sectional view indicates the relationship of parts in the finished work. This served to make the screws water-tight and at the same time afford a chance for movement longitudinally, as might be necessary. The cross seams in the gutter, we are informed, were made with ¾-inch lock joints, riveted with copper rivets and burrs, and soaked with solder on both sides. The upper edge of the gutter was turned out 1 inch, and the roof hooked on to it and then double-seamed, as clearly shown in the drawing. The sheeting for the deck was No. 18 corrugated iron, the corrugations measuring ¾ inch between centers. On top of this there was troweled ¾ inch of asbestos, the position of which is clearly shown in the upper part of the engraving. After this was hardened the copper was put in place, which was laid standing-seam fashion. The cleats were made in a peculiar form. One edge of the cleat was turned to fit over the standing seam, while the other was bent around a wire. A two-pronged prick punch was used to punch the holes through the asbestos and corrugated iron. Then, with a man above and a boy underneath with plyers to pull the wires through the holes and twist the ends together, the cleats were drawn down into place. The standing seam of the roof was made 2 inches high. The cleating of the upper edge of the gutter was accomplished in a manner somewhat similar, and is shown in the sketch. A piece of board was interposed at this part in order to facilitate the work.

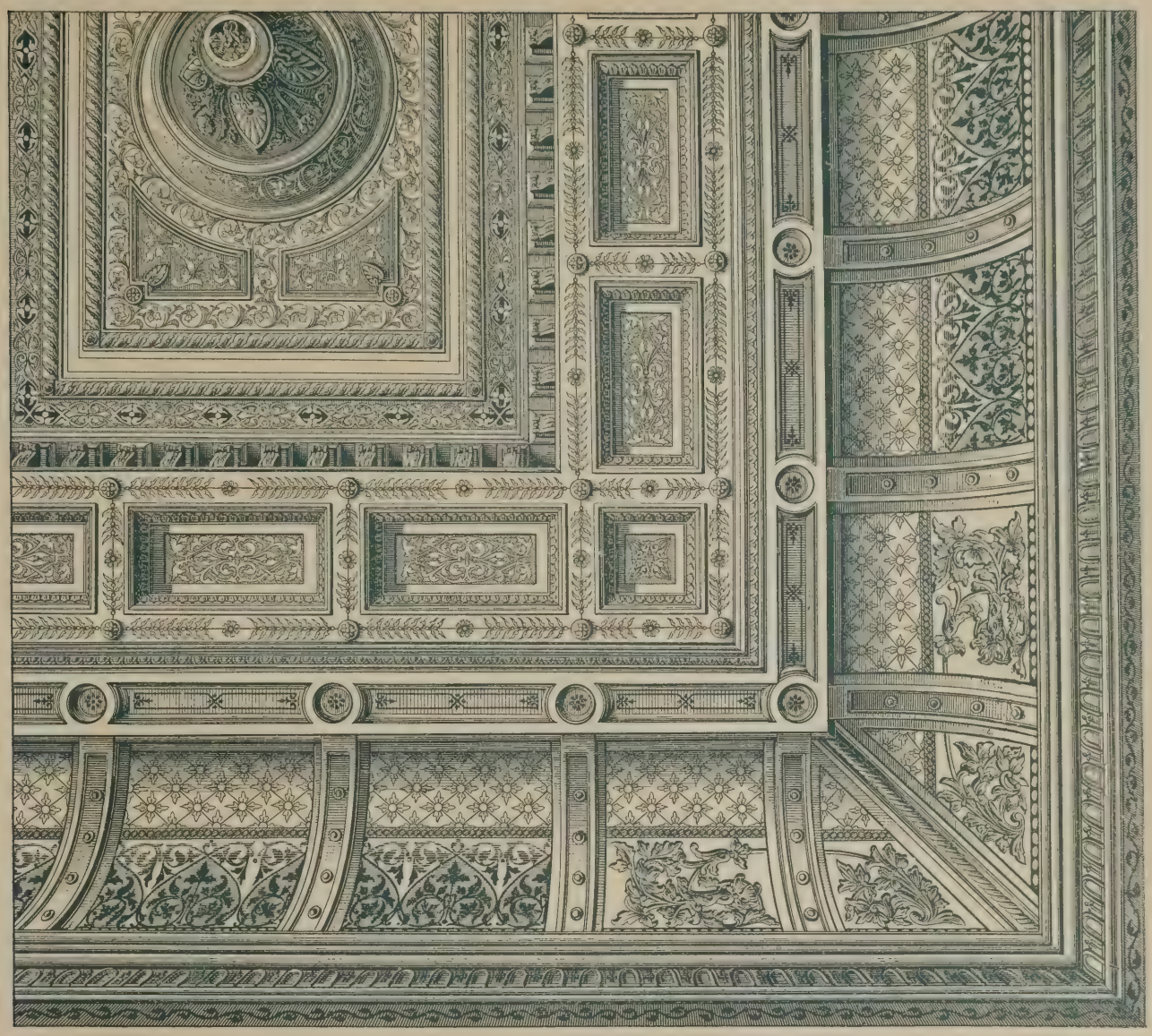


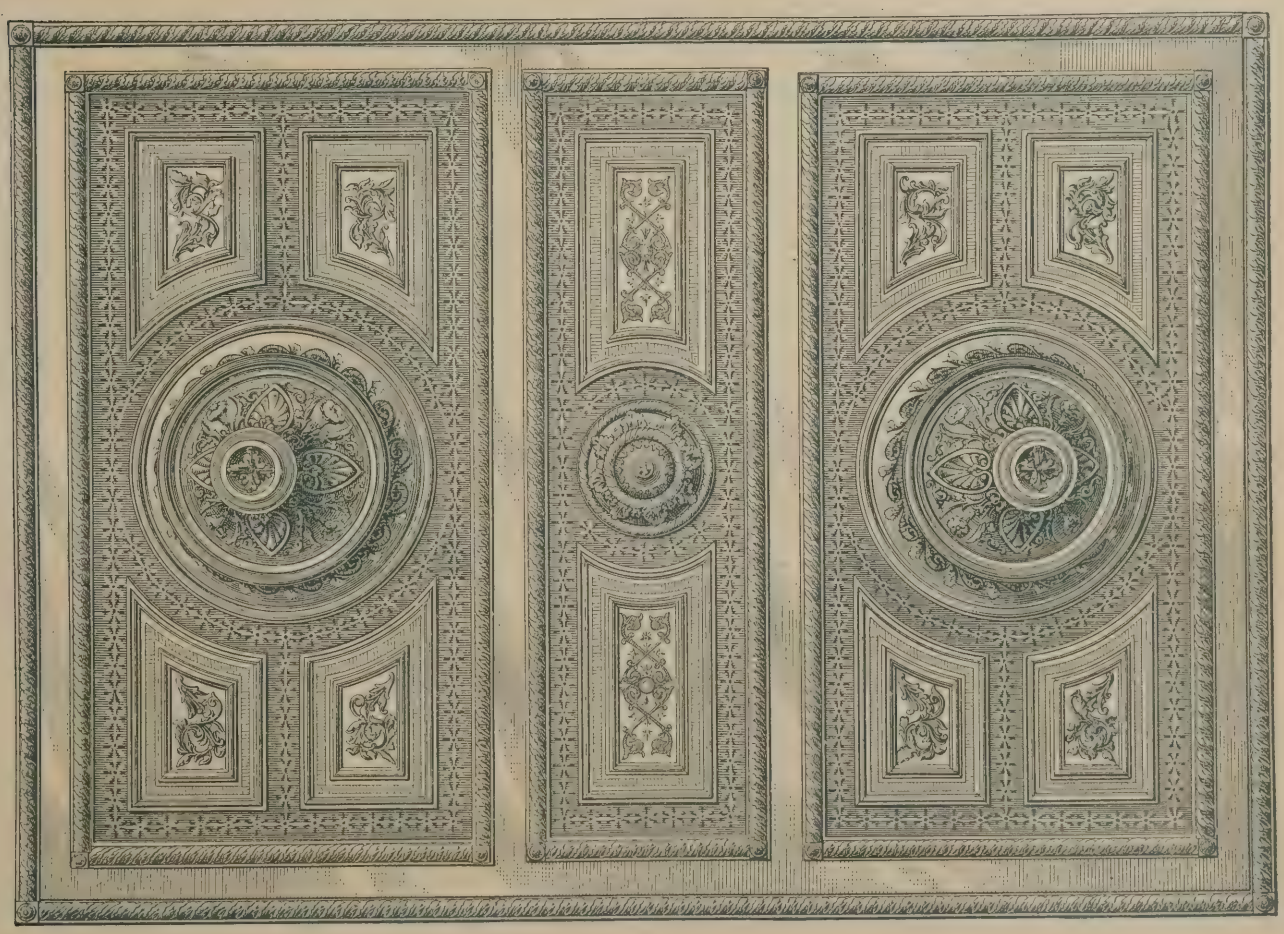


Cross Section Through Main Gutter of Columbus, Ohio, Court House.

The slate on the mansard portion of the roof of the courthouse was from Bangor, Pa., and was of extra thickness, measuring ⅜ inch. The shape of the mansard is convex, and, to overcome that kind of a curve in laying the slate, the slates were used lengthwise, or, as old-time slaters would designate it, they were "dutched." A conspicuous feature of the building in question is the tower, the entire outside of which is of galvanized iron. From No. 26 to No. 20 gauge was employed. The framework and lookouts are all of wrought iron. The tower is surmounted with the figure of Justice, nearly 13 feet in hight. The corridor of the main building is covered by a skylight of the Hayes variety, 120 feet long by 38 feet wide. Below this is a second or interior skylight, the bars of which are also of galvanized iron, in which is placed stained glass. The finish below the interior skylight is in the form of a galvanized-iron cornice, the proportions of which may be gained by the statement that it stands 6 feet high. The work here illustrated, and somewhat inadequately described, is among the most conspicuous contracts of the kind that have been executed in some time. We present the description simply as it reaches us and without comment on the use of the asbestos in the form suggested or the method of putting the work in place. This, of course, was a matter about which the contractors for the sheet-metal work had very little to say.

Slate is sometimes quarried in large blocks as well as other kinds of stone. The account reaches us from Castleton, Vt., that John Jones, of that village, a short time since took from his quarry a block of slate which contained 800 cubic feet.





Sheet Metal Ceiling Work in Court House, Columbus, Ohio. Engraved from Photographs.

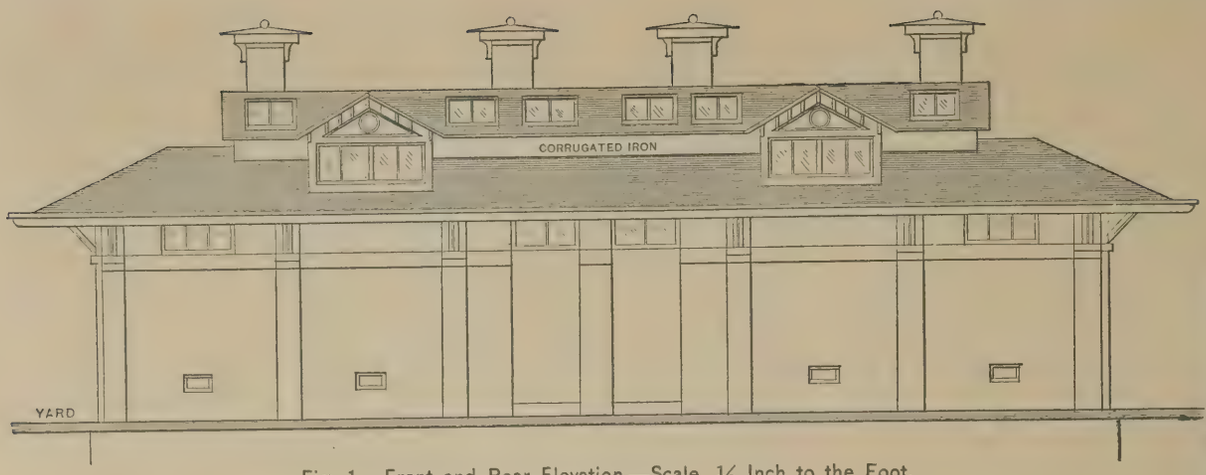


Fig. 1.—Front and Rear Elevation.—Scale, ⅛ Inch to the Foot.

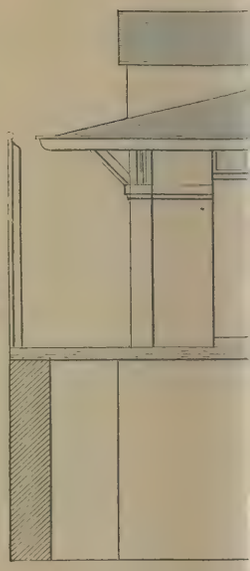


Fig. 5.—Side El

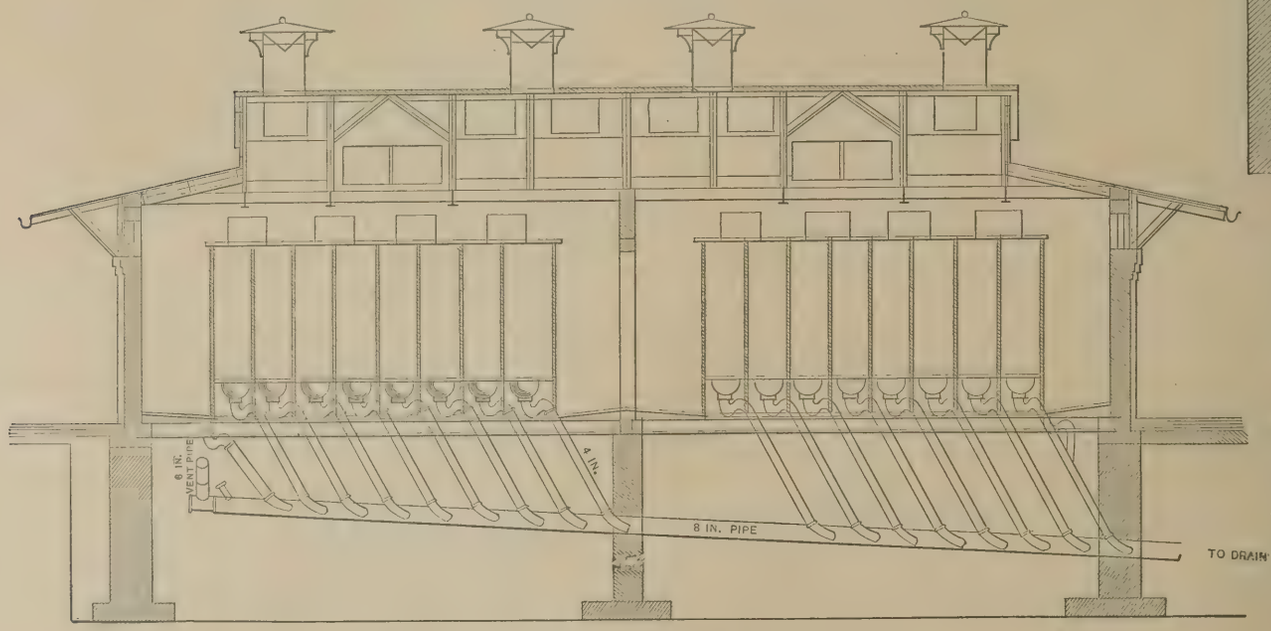


Fig 2.—Longitudinal Section —Scale, ⅛ Inch to the Foot.

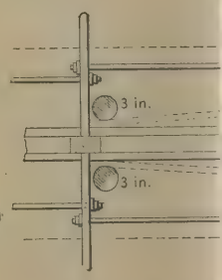


Fig. 6.—Plan of

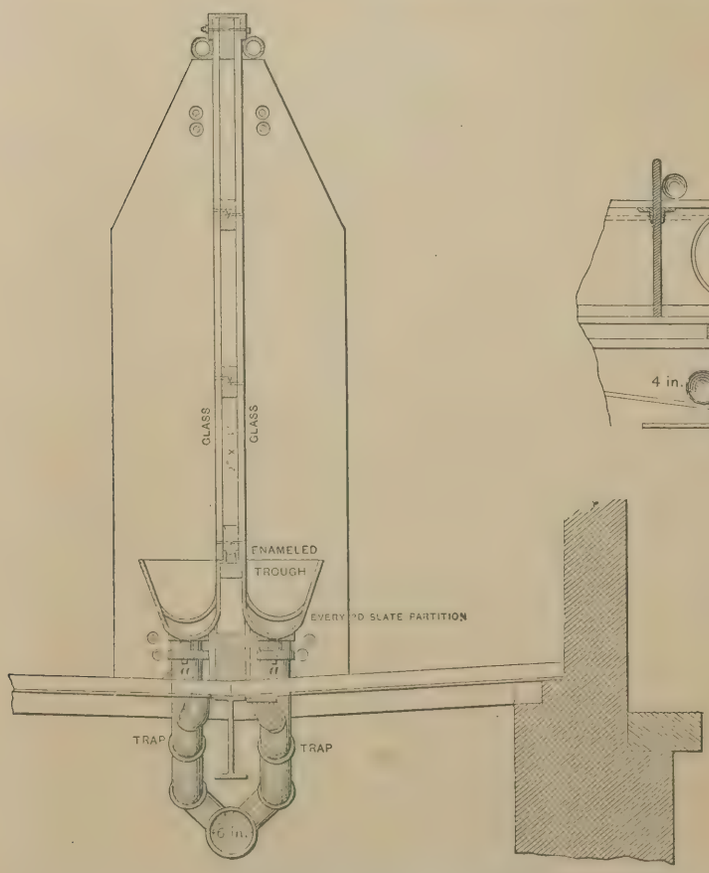


Fig. 3 —Cross Section, with Double Troughs.—Scale, ½ Inch to the Foot.

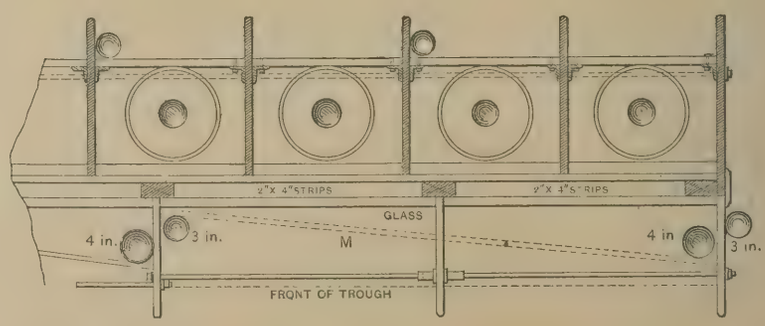


Fig. 4.—Plan of Combined Trough and Closet.
Scale, ½ Inch to the Foot.

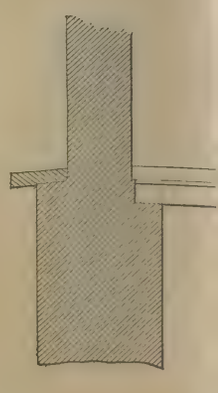
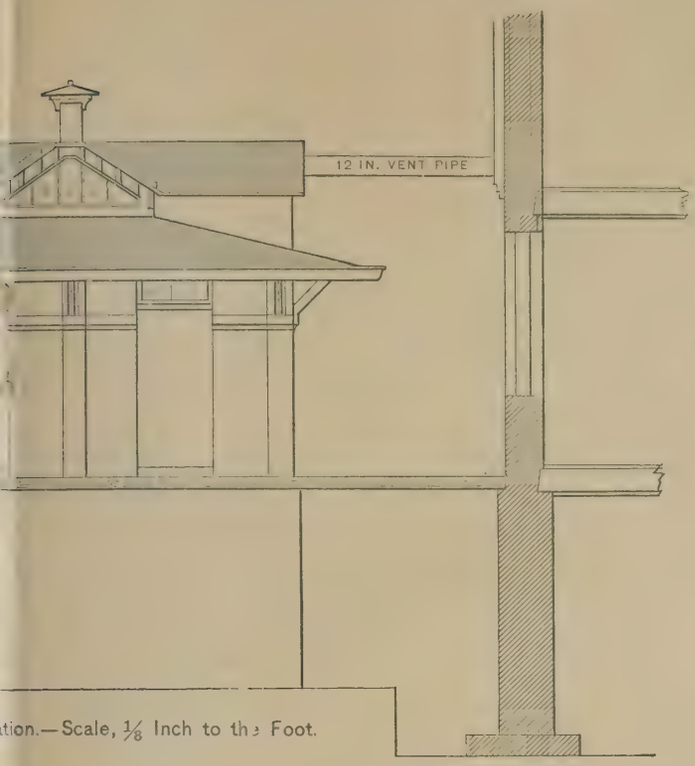


Fig. 7.—Cross Section, with Clos



tion.—Scale, ⅛ Inch to the Foot.

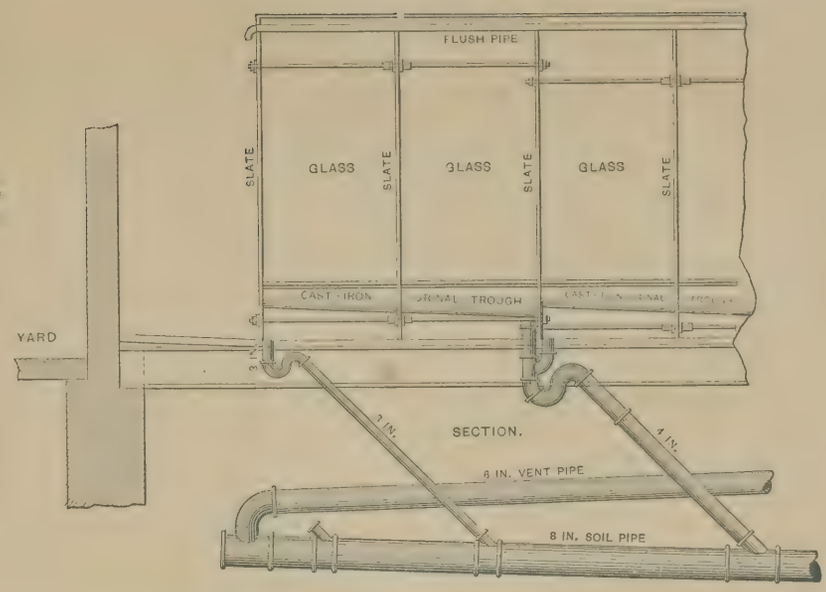
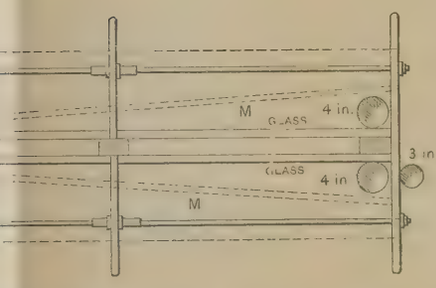
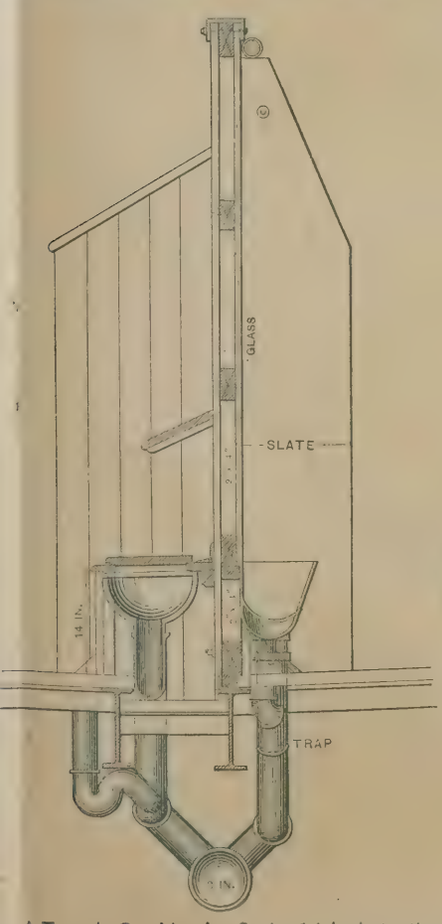


Fig. 8.—Partial Longitudinal Section, Showing Details of Construction.

Scale, ¼ Inch to the Foot.



uble Troughs—Scale, ½ Inch to the Foot.



and Trough Combined.—Scale, ½ Inch to the Foot.

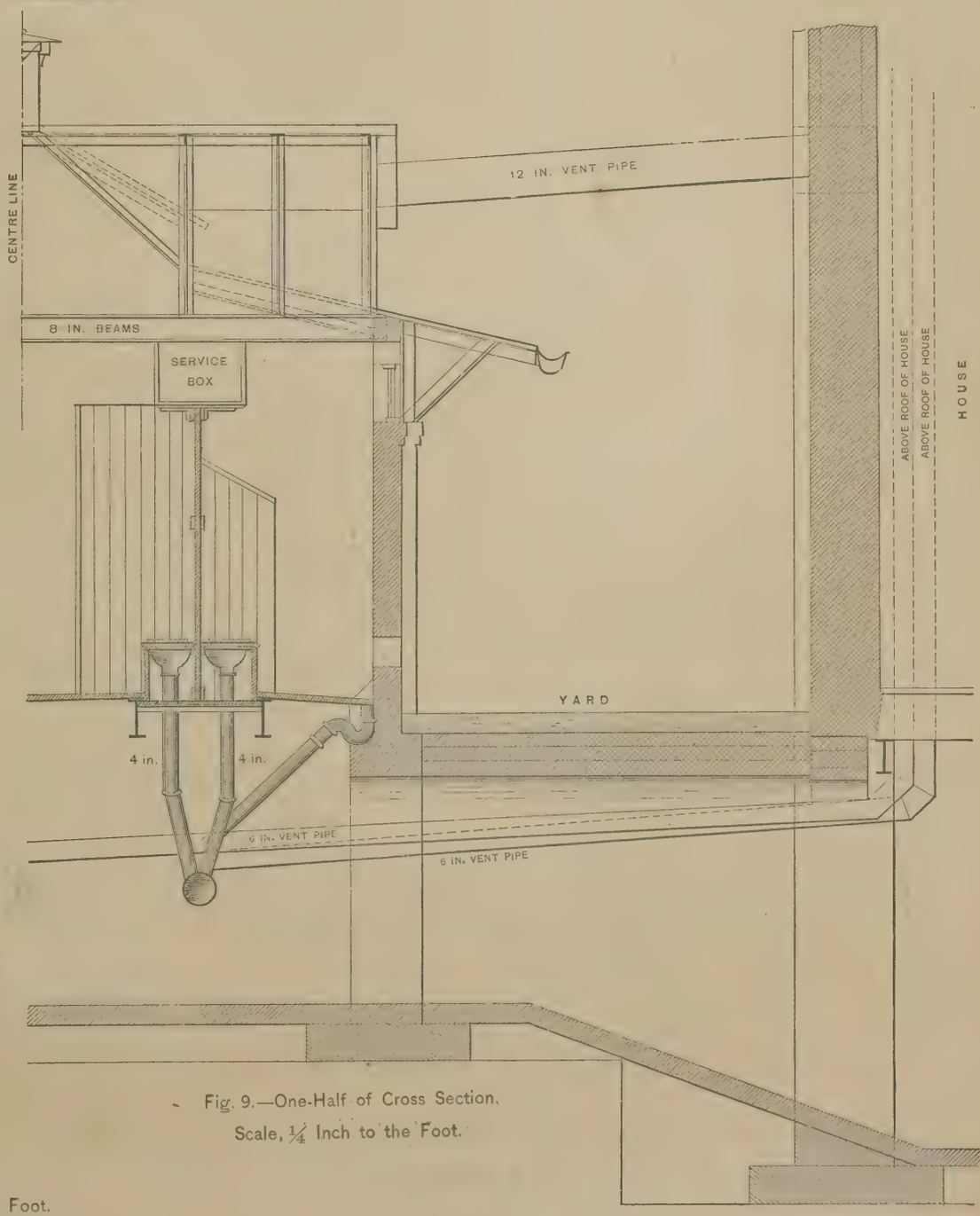


Fig. 9.—One-Half of Cross Section.

Scale, ¼ Inch to the Foot.

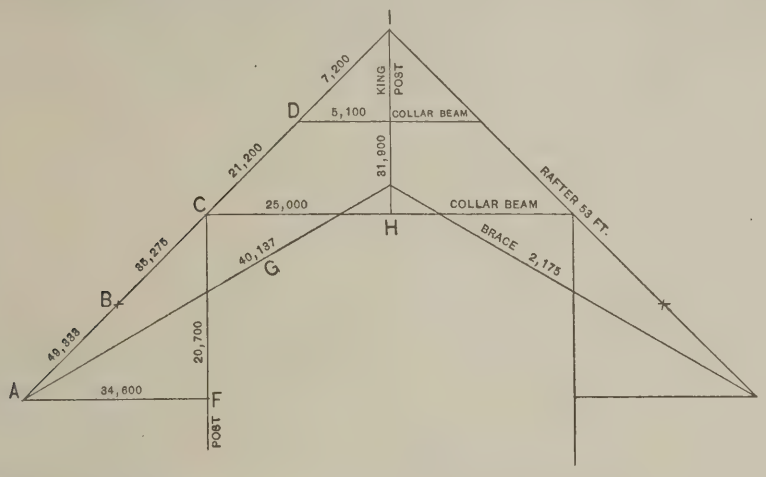
ITATION INTRODUCED IN THE NEW YORK PUBLIC SCHOOLS.

DRINKING FOUNTAIN AND CLOCK TOWER, PRESENTED TO STRATFORD-ON-AVON, BY GEORGE W. CHILDS, OF PHILADELPHIA, PA.

CORRESPONDENCE.

Strains in a Roof Truss.

From "CARPENTER," *New Jersey.*—I send you a sketch of a roof truss, Fig. 1, that I have been trying to find the strains in. It is



Question in Roof Strain.—Fig. 1.—Diagram Accompanying Letter from "Carpenter."

a king-post truss with collar beams bolted on the sides, supported with posts, as shown; The main braces abut against the king-post and are loaded 10,000 pounds at purlins B C D and I and 50,000 pounds at A. I am in doubt whether the main brace should be continued until it cuts the center horizontal, or made as shown in the sketch. Also whether the perpendicular marked I H, Fig. 4, will give the compression in the king-post. Does the perpendicular C F give the compression in the post? I think the greatest compression in the rafters is 49,333 pounds, and timber proportioned to resist with a factor of safety of 3 will be right. I make the compression of the tension of chord at the foot of rafter 34,600 pounds. Is it right to multiply the rafter, 53 feet, by 35,000 pounds, and divide by the hight, 37 feet 6 inches, to get the strain in the rafter? If you will answer this in *Carpentry and Building* you will oblige a subscriber.

Answer.—The sketches sent us by our correspondent are shown in Figs. 1 and 4. Before discussing the truss presented, it should be observed that, with the exception of the vertical load, no external force, as wind pressure, is included, and also that the transverse strains have not been considered. We find upon examining the conditions of the problem that each of the rafters is loaded symmetrically with respect to its center, and

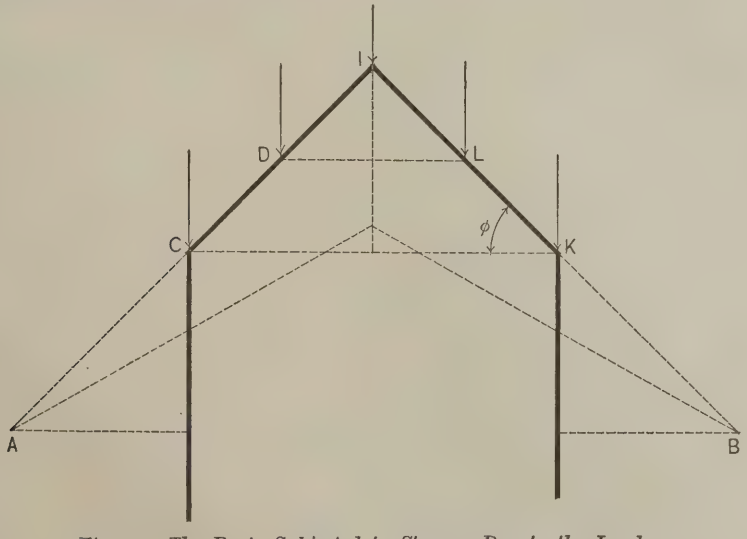


Fig. 2.—The Parts Subjected to Stresses Due to the Load.

that each with its load is entirely supported by a vertical post; we might say that each is balanced upon a vertical post, since the joints between the posts and the rafters have been chosen at the middle points of the rafters. The rafters and posts, as shown in Fig. 3, are then the only parts which would be subjected to stresses due to the load, and all other parts, as ties, braces, king-posts, &c., are, therefore, superfluous. It is not stated whether there as posts at A and B, but it is evident that they would also be superfluous, since no part of the load would be supported by them. It is hardly necessary to calculate the stresses in the rafters and posts after having eliminated all unnecessary parts which make the truss apparently so compli cated. It might, however, be stated that

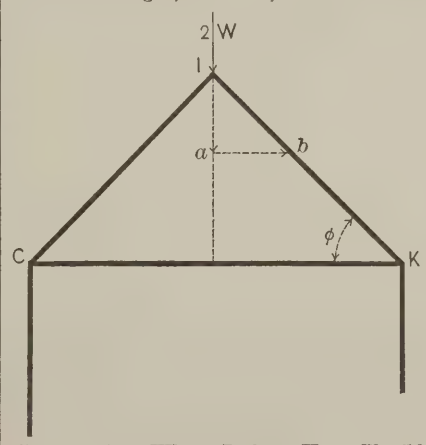


Fig. 3.—Case Where Rafters Have Flexible Joints at C and K.

the rafters would be subjected to compression in the parts above and to tension in the parts below the points of support. Had other points of support been chosen, or had the load been irregularly distributed, the problem might become complicated and possibly unsolvable. It is not clear what is meant by the main brace being "continued until it cuts the center horizontal," but, whatever is intended, it will make no difference whether or not it is continued, since, as has been shown, all braces are superfluous. In regard to the method used for finding the stress in a rafter, it is assumed that longitudinal stress is desired. Without going into a complete discussion of the formulas for rafters, let us briefly consider two or three simple cases for the purpose of discovering, if possible, under what circumstances the method employed would be correct. First, a case to correspond to the upper half of the given truss, as shown in Fig. 1. In order that the loads shall produce stresses corresponding to those produced in the given problem we must suppose that the posts are firmly fixed and rigidly joined to the rafters C I and K I, Fig. 2; also that there is no junction between the rafters at I. Each rafter then becomes an

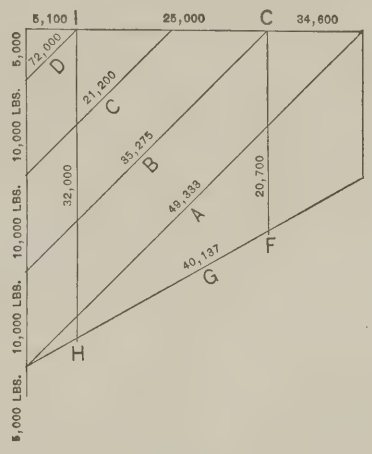


Fig. 4.—Strain Sheet as Worked Out by "Carpenter."

inclined beam, fixed at one end and loaded at the other. The longitudinal component of the stress due to a load at any point in such case is the product of the load into the sine of the angle of elevation. If there are loads distributed at different points along the beam, the maximum longitudinal stress will be the sum of such products.

Again, suppose we have a case as represented in Fig. 3, where the rafters C I and I K have flexible joints at C and K, abut at I, and are loaded only at the apex, the post

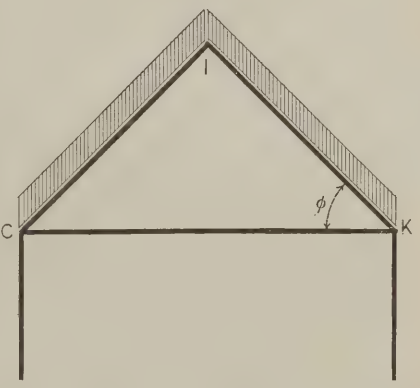


Fig. 5.—Case in Which There is Uniform Distribution of Load.

being held in position by the tie-beam C K. The longitudinal stress in either rafter will be the resultant of half the load at I and the horizontal reaction between the abutting ends. The forces which are in equilibrium at the upper end of one of the rafters may be represented by the triangle $a\,b$ I, in which a I represents the load W; $a\,b$, the horizontal reaction, and I b the longitudinal component in the rafter. From the triangle we have the value of the side representing the stress $= \frac{W}{sine\ \varphi}$; that is, the stress will be directly proportional to the load and inversely proportional to the sine of the angle of elevation.

Finally, in a case which is in practice more likely to arise than either of the pre-

ceding—viz., One in which the load is distributed uniformly along the rafter as in Fig. 5—the longitudinal stress in the rafter at any point will be the longitudinal component of the reaction between the abutting ends at the apex, plus the longitudinal component due the part of the load above the point considered. Hence, the longitudinal stress increases uniformly as we select points nearer and nearer the lower ends. (See Wood's "Bridges and Roofs" for formula.)

It will now be seen that the method given for finding the stress in the rafter could only be applied to the second case—that is where the rafters abut and are loaded only at apex.

If in Fig. 3 we let Q W = load at apex, l = length of rafter I K and h = hight I c the method employed may be expressed symbolically thus: Stress = $\frac{Wl}{h}$, which is equivalent to $\frac{W}{sine\ \varphi}$, the value as already determined, for $\frac{Wl}{h} = \frac{W}{\frac{h}{l}} = \frac{W}{sine\ \varphi}$. It is hardly necessary to add that this formula cannot be applied in the problem before us.

With reference to the factor of safety, the best authorities agree that it should not be less than 10 for wooden frames. We trust that what we have written will prove a satisfactory answer to our correspondent's inquiry, but if not we will be glad to hear from him again.

Try-Square.

From A., *Hudson, N. Y.*—In answer to the correspondent whose inquiry was published in the October number of *Carpentry and Building*, on page 204, I would say that the try-square he describes is mentioned in the catalogue of Tollman & McFadden for 1886-87, on page 336. I understand that this catalogue is supplied to builders upon application.

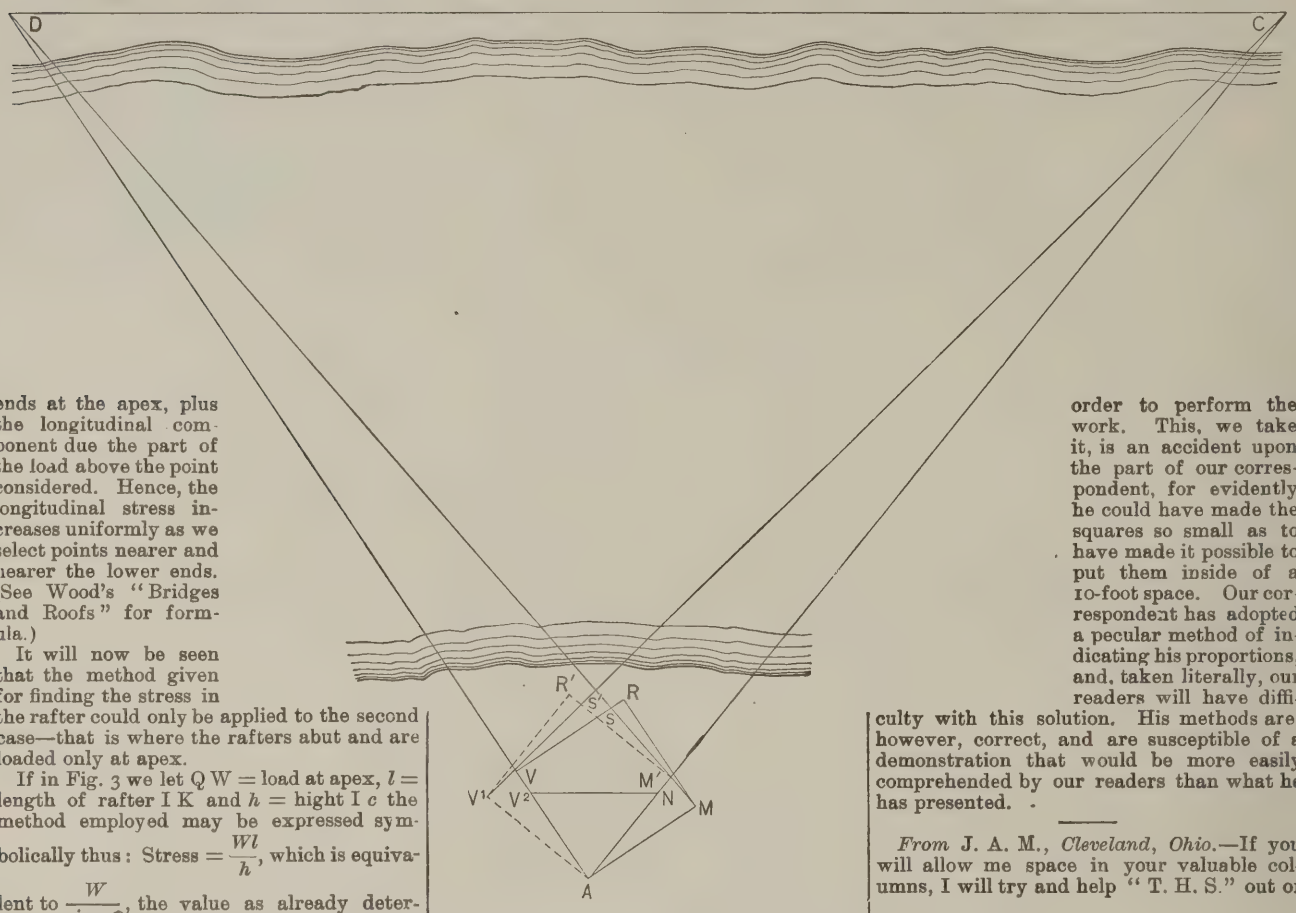
From S. M. P., *Oakland, Fla.*—Your correspondent, "J. C. B.," of Bristol, Conn., who asks about a try-square in the October number of *Carpentry and Building*, can obtain the same from Tallman & McFadden, 1025 Market street, Philadelphia, Pa. He will find illustrated in their catalogue just what he describes, except that the stock is iron instead of brass. The same tool is made with a brass stock without a bevel, and is sold by Charles A. Strelinger & Co., Detroit, Mich. I have one with the bevel, but I find it of comparatively little use.

Construction of Gutter.

From S. F. B., *Wellington, Ohio.*—In answer to "T.," of Iowa, I would say that I would run the tin at least 12 inches up the roof, and then lay a double course and let it run past the chimney 3 inches each way, and then down the edges of the shingles. I lay a wide one over the thin edge, and by so doing get a smooth, nice-looking job.

Surveying Problem.

From E. D. V., *Kinsman, Ohio.*—The surveying problem contained in the October issue of *Carpentry and Building* is easily solved by either of several methods. I present one of them herewith: B has his stakes at C and D, as indicated on the diagram. Let A take his position on the opposite side of the river, about midway between C and D; from the point A lay out a square with sides 10 feet each, as indicated by A M R V; let A V be in line with D; join D M; then D V = $\frac{V S \times S R}{M R}$. Revolve the square on its corner, A, until the sides take the position A M^1 R^1 V^1 then is the side A M^1 in line with C and C M^1 = $\frac{S^1 M^1 \times S^1 R^1}{V^1 R^1}$. Adding to each A M, or the side of the square, we have A D A C. Now, take any point V^2 on the line A D; set a stake and measure a distance A N equal to $\frac{A C \times A V}{A D}$. From A on the line A C join V^2 N; then D C = $\frac{A D \times V N}{A V}$. Thus it will be seen that A does not move out a space 10 feet square.



Surveying Problem.—Fig. 1.—Diagram Submitted by E. D. V.

In practice if the lines D C or A C are very long as compared with the side of A's square the computation will be inaccurate even with the best instruments at command. The civil engineer does not trust the accuracy of computed lines from small angular measurements. If C D or A D were 1 mile, then A could never place the side of his square mathematically in line with either C or D. The author of the problem has therefore unwisely limited A and has given liberally to B. C D can only be approximately determined by any method. Referring to the diagram it is evident that in the figure A M S D V we are practically measuring the angles at D A and M, but when A is so limited in his movements that the angle D must be very small the accuracy of the solution is proportionately reduced. If the distances A D or A C could be accurately determined, then, instead of taking A V^2 and A N on those lines to determine D C, it would be of advantage to take the longest possible distance on both A D and A C.

Note.—Our correspondent's method seems to be correct, but inadvertently he constructs two diagrams 10 feet square, which are not coincident in position. Accordingly A would have to go outside of his limits in order to perform the work. This, we take it, is an accident upon the part of our correspondent, for evidently he could have made the squares so small as to have made it possible to put them inside of a 10-foot space. Our correspondent has adopted a pecular method of indicating his proportions, and, taken literally, our readers will have difficulty with this solution. His methods are, however, correct, and are susceptible of a demonstration that would be more easily comprehended by our readers than what he has presented.

From J. A. M., *Cleveland, Ohio.*—If you will allow me space in your valuable columns, I will try and help "T. H. S." out of the difficulty with the stakes. To make my theory more easily understood I inclose sketch calling A's position A; the stakes "B" and "C," the points where I take my

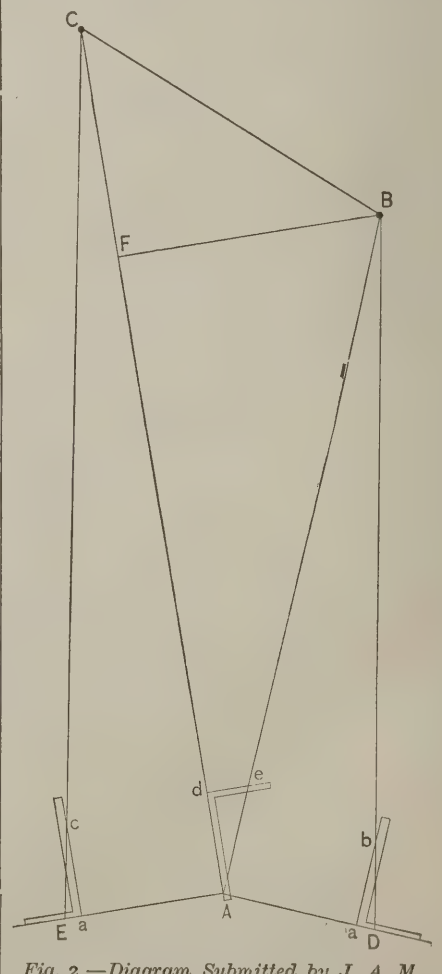
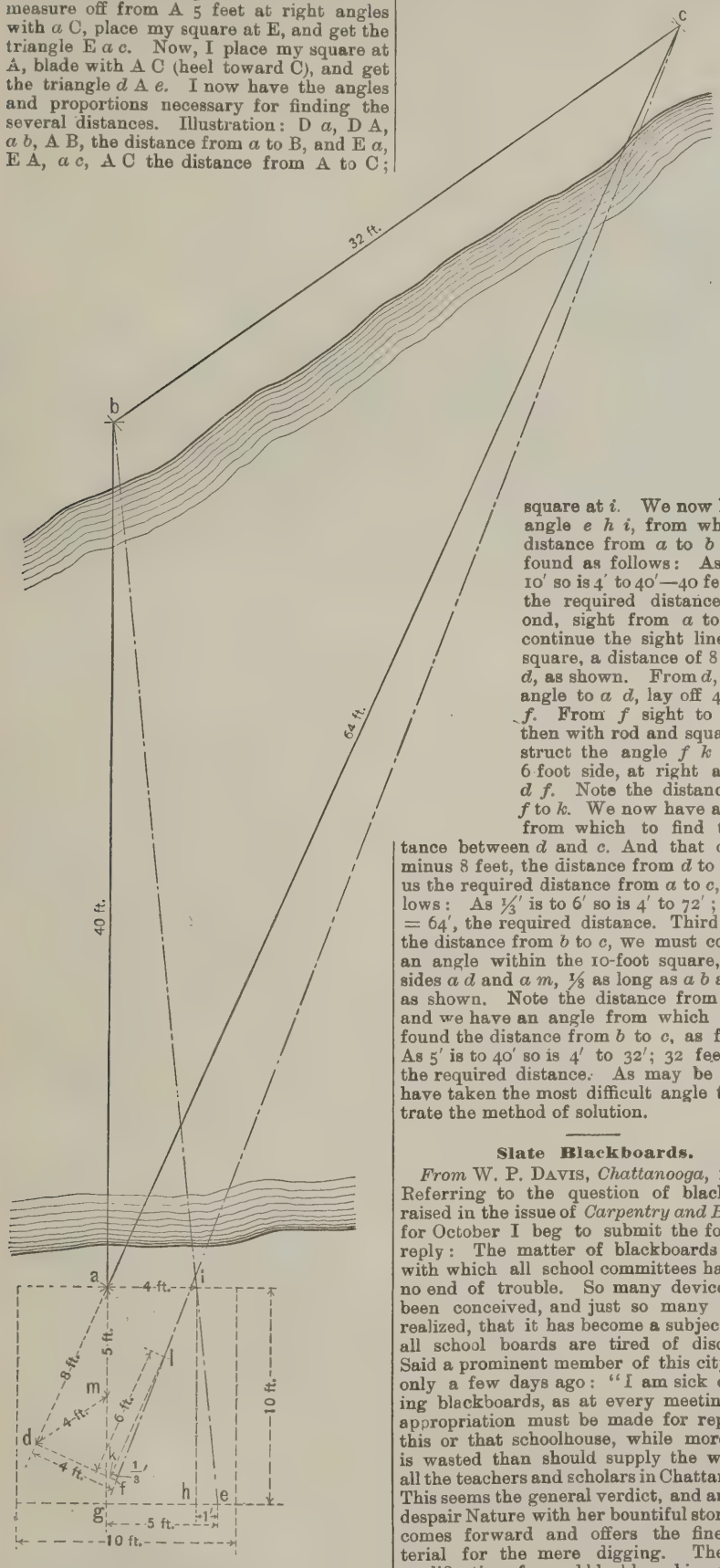


Fig. 2.—Diagram Submitted by J. A. M.

ratios D and E; the small letters will explain themselves as I go along. Now, to proceed, I measure off 5 feet from A at right angles with A B, place my square at D and get the triangle D *a b*. Likewise I measure off from A 5 feet at right angles with *a* C, place my square at E, and get the triangle E *a c*. Now, I place my square at A, blade with A C (heel toward C), and get the triangle *d* A *e*. I now have the angles and proportions necessary for finding the several distances. Illustration: D *a*, D A, *a b*, A B, the distance from *a* to B, and E *a*, E A, *a c*, A C the distance from A to C; also, A *e*, A B, *e d*, B F; again, *e d*, B F, A *d*, A F; then again, B F C, A F B, A B, B C, the distance from B to C.



Surveying Problem.—Fig. 3.—Diagram Submitted by J. F. M.

From J F. M., *Paterson, N. J.*—I inclose a diagram and offer the following solution of the surveying problem by "T. H. S.," in the October number of *Carpentry and Building:* First, sight from *a* to *b*, and with the 10-foot rod continue the sight line across the 10-foot square to *g*. From *g*, at right angles to *a g*, lay off 5 feet to *e*. From *e* sight to *b*, and note where sight line intersects the square at *i*. We now have an angle *e h i*, from which the distance from *a* to *b* may be found as follows: As 1′ is to 10′ so is 4′ to 40′—40 feet being the required distance. Second, sight from *a* to *c*, and continue the sight line across square, a distance of 8 feet, to *d*, as shown. From *d*, at right angle to *a d*, lay off 4 feet to *f*. From *f* sight to *c*, and then with rod and square construct the angle *f k l*, with 6 foot side, at right angle to *d f*. Note the distance from *f* to *k*. We now have an angle from which to find the distance between *d* and *c*. And that distance minus 8 feet, the distance from *d* to *a*, gives us the required distance from *a* to *c*, as follows: As ⅓′ is to 6′ so is 4′ to 72′; 72′ − 8′ = 64′, the required distance. Third, to find the distance from *b* to *c*, we must construct an angle within the 10-foot square, having sides *a d* and *a m*, ⅛ as long as *a b* and *a c*, as shown. Note the distance from *d* to *m*, and we have an angle from which may be found the distance from *b* to *c*, as follows: As 5′ is to 40′ so is 4′ to 32′; 32 feet being the required distance. As may be seen, I have taken the most difficult angle to illustrate the method of solution.

Slate Blackboards.

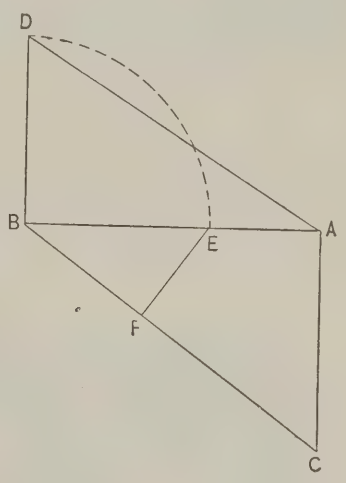
From W. P. Davis, *Chattanooga, Tenn.*—Referring to the question of blackboards raised in the issue of *Carpentry and Building* for October I beg to submit the following reply: The matter of blackboards is one with which all school committees have had no end of trouble. So many devices have been conceived, and just so many failures realized, that it has become a subject which all school boards are tired of discussing. Said a prominent member of this city board only a few days ago: "I am sick of talking blackboards, as at every meeting some appropriation must be made for repairs in this or that schoolhouse, while more chalk is wasted than should supply the wants of all the teachers and scholars in Chattanooga." This seems the general verdict, and amid this despair Nature with her bountiful store again comes forward and offers the finest material for the mere digging. The chief qualification of a good blackboard is a smooth, regular surface. How often have we entered country and city schools and on the rough, lumpy surface of a painted wall seen the scholars endeavoring amid clouds of dust to work their problems or erase former writing, a work in itself of no little difficulty. In reply, then, to all questions for satisfactory blackboards only one answer can be given—viz., use slate. With a surface as smooth as glass, writing on it is a pleasure, and erasure just as easy. No lumps to break or waste chalk, no paint to wear through with a few months' usage, it is unequaled for this purpose. Of a beautiful color, easily put up, joints invisible, it is an ornament and an invaluable one to any college or schoolroom in the land. After a week of trial its popularity with teacher and scholar bears ample testimony to its worth.

Staging Bracket.

From S. F. B., *Wellington, Ohio.*—I think my bracket is superior to that suggested by "E. P." With his, one man has to hold the bracket in place while another screws on the nut. If the house is plastered, it is impossible to use the bracket. With mine, on the other hand, it is used entirely from the outside, and does not interfere with the mason in the least. I propose to make a few brackets of the kind suggested with heavier timbers, and the level piece about 7 feet long. With such a bracket I can readily stage past a bay-window, or reach the cornice of a porch with the bracket bolted to the house.

Another Steel Square Problem.

From Fred. Lascy, *San Francisco, Cal.*—I send you a new steel square problem. Given a hopper or hipped roof which stands on a base whose corners have any angle whatever, and whose sloping sides have the same run and the same rise of any length. Required the diedral angle between any two adjoining sloping sides without using the hip line; or, what is the same thing, to find the backing of the hip rafter without using the hip line. First lay off A B = run, B D = rise, A D = slope line. Draw A C at right angles to the run, and lay off angle A B C = 90°, minus half the angle of the corner of the base. Angle 6 = half angle of corner of base. Make B E = rise, and draw E F at right angles to B C, the seat of the hip line. On the edge of a board lay off G F = slope A D. By the steel square on line G F: Place E F on the tongue and apply the tongue as shown on the diagram, moving the blade until the blade cuts the point G. Mark along the tongue. E F G = one-half the required diedral angle = diedral miter. By calculation: Cos. diedral miter = rise × cos. half-corner angle C. The demonstration may be studied in any book on solid trigonometry which treats on the right triangular pyramid. It is too long to be given here. Without using the steel square: Draw a semicircle on F G, and, taking F E in the compasses, mark the chord line E F. This gives the diedral miter E F G to back the hip rafter.



Steel Square Problem Submitted by Fred Lascy, Fig. 1.

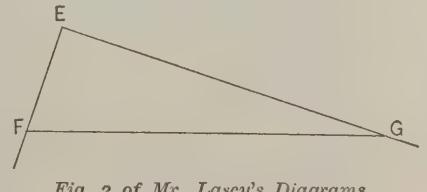
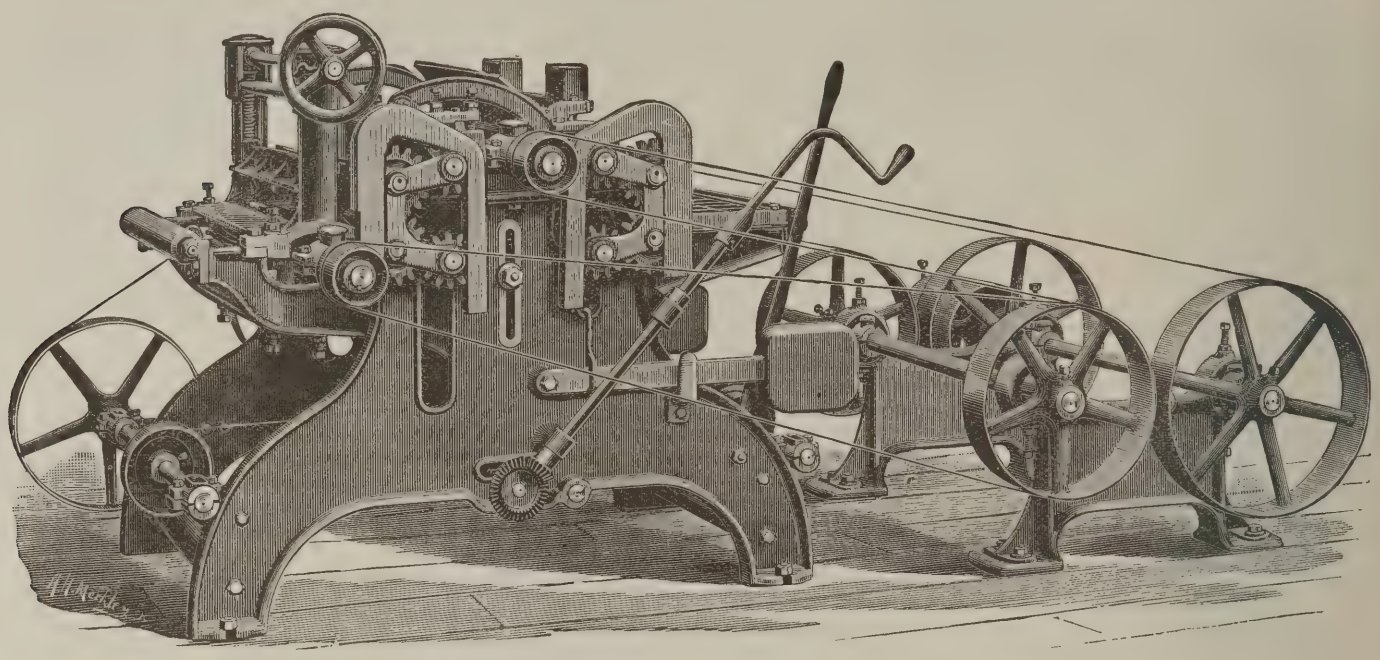


Fig. 2 of Mr. Lascy's Diagrams.

NOVELTIES.

New Double Surfacer.

Goodell & Waters, of Philadelphia, are directing attention to what they describe as their No. 1 Double Surfacer, made from new patterns. The machine is described as being very compact, and so constructed as to be accurate and convenient. It is also declared to possess all the advantages of the lowering bed principle. The pressure bars are conveniently arranged, swinging in such a manner as to come as near the cutting edge of the knives as possible; this insures smooth work. With reference to the capacity of the machine, it is asserted that it will surface 24 inches wide and 6 inches thick. Changes for various thicknesses may be made quickly. The makers are specially recommending this machine to users requiring a substantial article for fine and smooth work, and that, too, at a low first cost. The engraving, Fig. 1, so clearly shows the general features of the machine that further details are scarcely necessary.



Novelties.—Fig. 1.—New Double Surfacer, Manufactured by Goodell & Waters, Philadelphia.

The Turner Heater.

We present, in Fig. 2 of the accompanying engravings, a sectional view of a hot-air furnace recently placed on the market by the Turner Rapid Heat Circulator Company, whose office is at No. 7 Colony street, Meriden, Conn. The furnace is the invention of Mr. L. W. Turner, of Yalesville, Conn., and represents the results of long and careful study of the question of heat. Our readers will be enabled to form a good idea of the general arrangement of the parts and the manner in which the furnace operates by the following description, read in connection with the reference letters of the engraving: In the illustration A A are pipes through which the cold air taken from outside the furnace is conducted to the hot-air chamber designated by the letters B B. By this arrangement the hot-air reservoir is rendered independent of the chambers E E, a point to which the makers direct attention. The cold air passing through the chambers E E is supplied by means of openings, G G, and is heated by coming in contract with the exterior surface of the chambers represented by C C, through which the draft is furnished. The chambers C C also serve as outlets for any unconsumed gases. It will be noticed by reference to the engraving that the cold air with which the furnace is supplied is taken from the outside through the flue F. Directly over the fire-pot is a combustion chamber, D, into which the flame ascends, carrying with it unconsumed products, which become heated and mixed with a proper portion of air admitted through a damper in the door or by other suitable means. The shape of the chamber is such that after ascending a short distance the products of combustion are deflected downward and escape to the chamber formed by the outward surface of the circulator and the inward surface of the furnace. Their course to the smoke-pipe is clearly indicated in the engraving by arrows. The company claim that the principle embodied in this furnace is applicable to cooking stoves and ranges, and that it may be employed in connection with portable and stationary ovens, evaporators and the like. The fire-pot is so arranged as to consume a small amount of fuel in proportion to the heat produced, and the makers claim for the device simplicity of construction, economy of fuel and powerful operation.

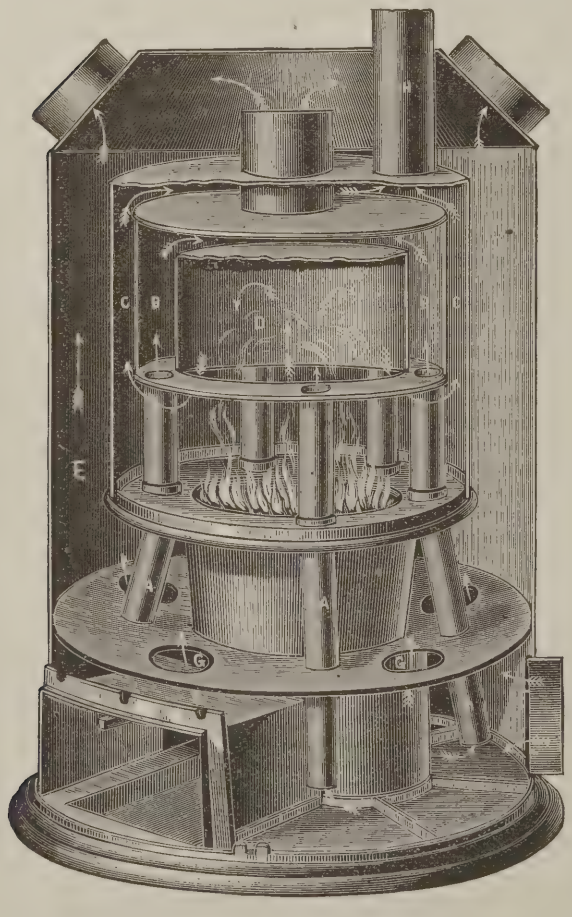


Fig 2.—The Turner Furnace.

The Pullman Sash Balance.

The Pullman Sash Balance Company, Rochester, N. Y., are putting on the market a sash balance, which is represented in Fig. 3, given herewith. This is a compact device designed to do away with cast-iron and lead weights for balancing sash. It consists, as will be inferred from the engraving, of a frame which is made of steel, and given a brass front-plate if desired. This frame holds a drum, which is operated by a spring within it, so that the metallic band by which the sash is supported is wound around the drum. This spring is described as the best quality of coil clock spring. There is an adjusting screw near the top of the front-plate, by means of which the revolutions of the drum is con-

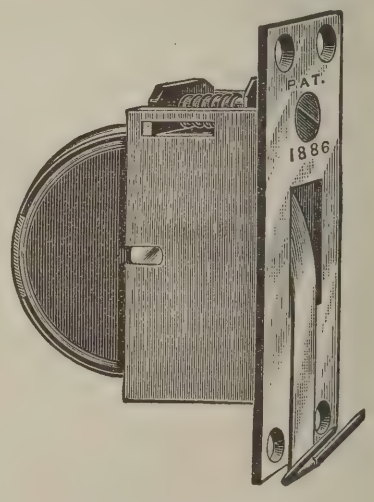
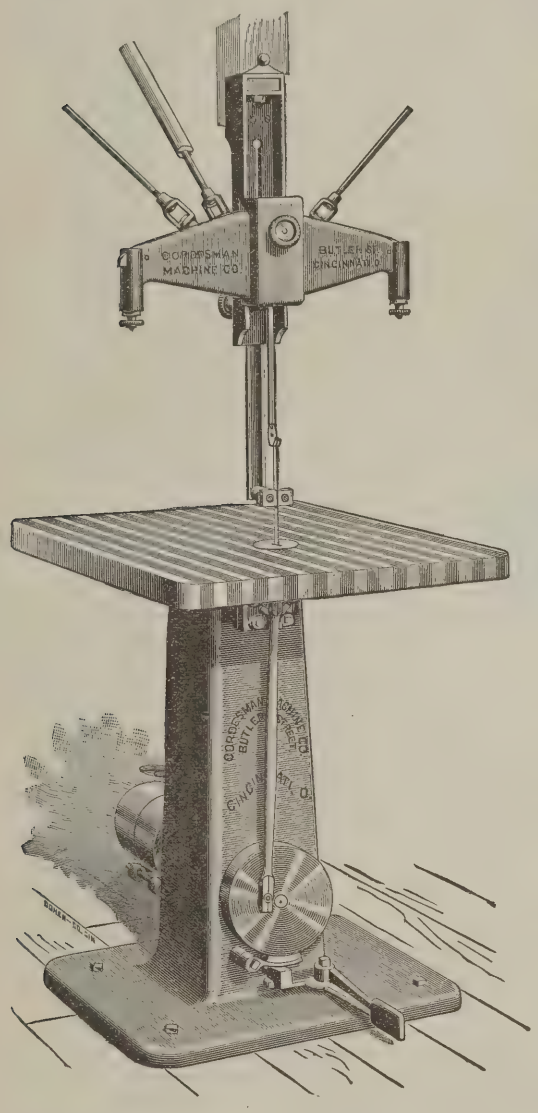


Fig. 3.—The Pullman Sash Balance.

trolled, as by it the tension band pressing upon the band coiled round the drum is operated, a perfect balance being thus secured. With this device, the point is also made that the added thickness of the coil as the sash is raised operates on the tension band, and prevents the sash being brought violently against the top of the window. The sash balance is adapted to windows of different weights by varying the width and thickness of spring. Three sizes of casings are made, the smallest being used in Nos. 0, to 5, for windows weighing from 4 to 15 pounds, the second in Nos. 6 to 17, for windows weighing from 15 to 50 pounds, and the third, which the company are just completing, taking in the larger sizes and adapted to sashes weighing up to 130 pounds. It will thus be seen that a large variety of these balances are made, adapted for use on sashes weighing from 4 to 5 pounds and upward. In regard to this balance the following advantages are mentioned by the company: That there is no necessity for boxes or pockets in the frame and no grooving to be done in sash; that it can be applied to old work without altering the frame or sash, and without disturbing paint or present fixtures; that it can be perfectly adjusted to the weight of the sash and a perfect balance gained; that the sash being suspended by a metallic band there is no wearing out of the cord, and the whole balance being put in with screws, in case of accident it can be taken out with little trouble; that it is durable and works without noise or roll, and that it costs no more than weights for ordinary sized windows, and considerably less than weights for large windows.



Novelties.—Fig. 4.—Cordesman Machine Company's New Scroll Saw.

New Scroll Saw.

The Cordesman Machine Company, No. 27 Butler street, Cincinnati, Ohio, are directing attention to a new scroll saw with patent adjustable strain which they are introducing. It is claimed that this machine, Fig. 4, embodies every improvement which has been suggested by years of practical experience. They also say it is designed for both light and heavy work, and will do either to the very best advantage. The rapidity with which the saws can be changed for external and internal sawing makes the machine particularly desirable for all kinds of woodwork. The column is in pedestal shape, cored out and cast in one piece with a wide base, which gives the machine a solid floor support. The shaft is made of steel, and runs in long self-oiling babbitted bearings. The crank-wheel is balanced and securely fitted to the shaft. The pitman rod is made of second growth hickory, and is carefully finished. The adjustable slides are made of gun metal, and are placed beneath the table. The crosshead, which operates in gun-metal slides, is made of solid steel forging, and is so arranged that the saw may be instantly detached or replaced. The table measures 30 x 36 inches, and is made of alternate strips of black walnut and cherry. The center plate is of brass. The underside of it is fitted with an adjustable wood saw guide, so constructed as to be quickly readjusted or replaced in case of wear. The patent adjustable strain is described as simple and effective. The tension is even throughout, the strain being produced by two steel coiled springs working in bored cylindrical cups provided with a hand wheel and screw, so that the tension may be increased or diminished at will. The strap to which the upper end of the saw is attached is fastened to two light hardwood levers working on pivots, and connected with springs producing a direct tension. The belt shaft and brake is placed at the base of the machine, and the operator can stop and start it by a simple movement of the foot.

Fig. 5.—Concave Head Wire Finishing Nail.

Concave Head Wire Finishing Nails.

The Meadville Wire Nail Company, Meadville, Pa., are putting on the market patent concave head finishing wire nails and brads which have a countersink in the head to hold the point of a set punch and prevent it from slipping off in the operation of driving. These nails are represented in Fig. 5 of the illustrations. They are referred to as especially adapted for hardwood finish, and also for putting up gilt and other moldings in rooms, preventing as they do the marring of the wood, and enabling the workmen to set the nails rapidly. These nails are described as made in all sizes of the best steel wire, and at the same price as the common finishing wire nails. They are said to give satisfaction wherever introduced, and to fill a long-felt want among carpenters, furniture-makers, &c.

Ladder Clutch.

The painters' scaffold shown in Fig. 6 of the accompanying engravings is hung to two ladders which are set leaning against the house, by means of an automatic clutch attachment, the general features of which are indicated in Fig. 7. The clutch is of use for other purposes than hanging a scaffold as here illustrated. It affords a means for attaching a pulley at any point upon a ladder, and accordingly may be used for hoisting lumber, swinging timbers, &c. The clutch is so constructed that it adjusts itself to any ladder and is easily attached or removed. Each side piece of the ladder is provided with the clutch attachment, which is so arranged that the heavier the weight upon it the tighter the clutches are drawn. The two clutches are connected by an iron rod and chain, as shown in Fig. 7. The construction in this respect is such as to allow the attachment to be applied to a ladder of any width. The arrangement of parts it such that an equal bearing is given to both sides of the ladder. An advantage in swinging a hanging scaffold by means of ladders, as shown in the

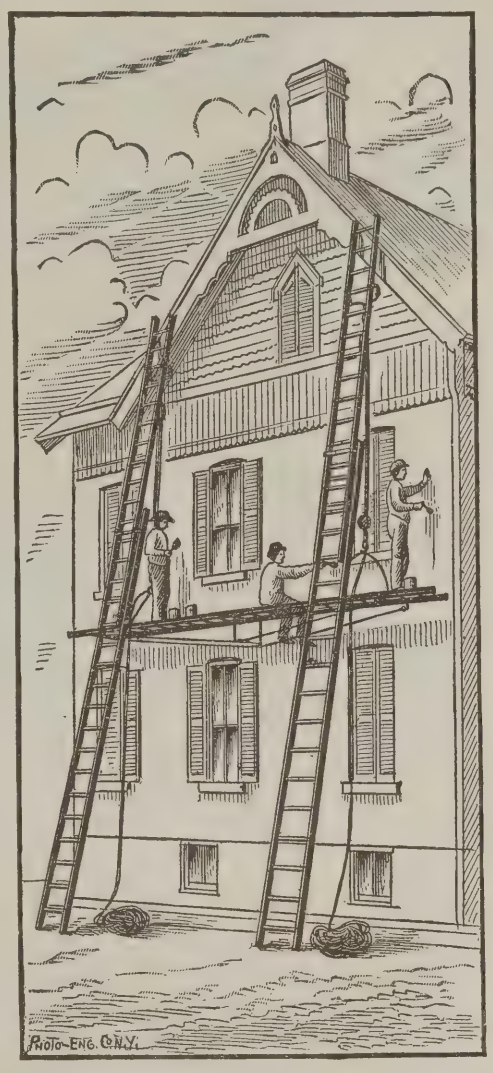


Fig. 6.—Automatic Clutch Attachment in Use.

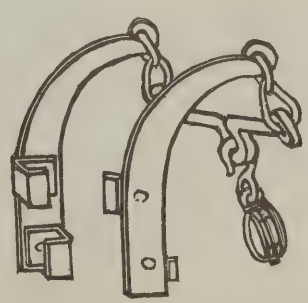


Fig. 7.—Automatic Clutch Attachment for Ladders.

large engraving, will be appreciated by many of our readers. The scaffold hangs in such a way as to bring the weight directly downward, thus making the ladders firm and steady. Should it become necessary for the workmen to descend to the ground for anything, they can step from the swinging ladder to the perpendicular ladder at any point between top and bottom. We hear this device well spoken of by a number of painters and others who have it in use.

The Acme Sash Fastener.

P. & F. Corbin, New Britain, Conn., have recently put on the market the Acme Sash Fastener, which is represented in Fig. 9 of the illustrations. This fastener is operated by an eccentric, moved by the lever shown. This lever, when the fastener is open, is on the other side from that on which it is represented in the cut, which shows the fastener closed. The first quarter turn of the lever brings the engaging hook in connection with the portion of the fastener on the other sash and locks it, while the next quarter turn, to the position shown in the cut, draws the hook inward, and thus completes the operation, locking the sashes rigidly. Special emphasis is laid on the fact that this sash fastener is made of wrought metal, and is, consequently, not so easily broken as the regular line now in the market. It is made in a variety of finishes, to adapt it to the requirements of the trade, wrought iron with amber finish, also copper-plate, brass-plate and bronze-plate, and also in genuine brass and bronze metal.

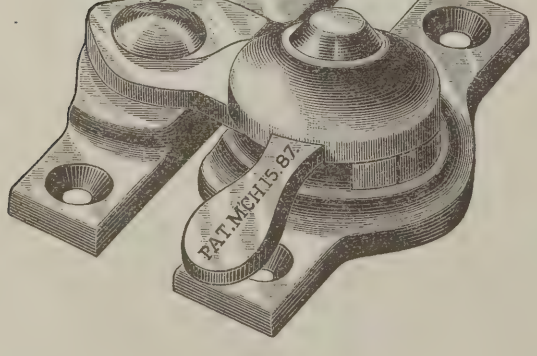
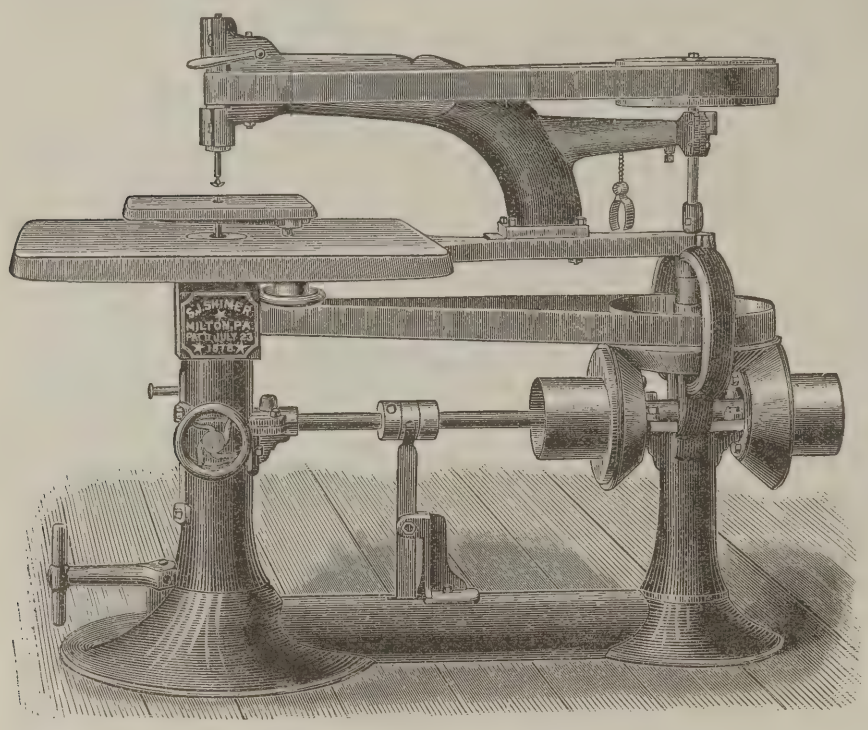


Fig. 9.— The Acme Sash Fastener.

Variety Molder.

We show in Fig. 8 a variety molder made by S. J. Shimer, of Milton, Pa., and which possesses recent features that add to its general utility. It is designed for sinking panels with a pattern guided by a pin that automatically takes its position when the machine is started, and that drops out of the way when the machine is stopped. The cutter in the overhanging arm of the machine has a perpendicular adjustment of 1 inch. It is operated by the handle, shown in the cut, attached to an eccentric lever that is automatically locked to one position when at work. The T on the base of the machine connects with an eccentric joint between springs below the base plate and works the shipping lever. The T will stand at any angle, and is set to the right or left with the foot. Accordingly the operator's hands are free to move his work to the cutter, which is instantaneous in its action, and is under such command that it can be brought to full speed or at a standstill in a second of time. The work is done on the small table. This table is adjustable by means of a hand-wheel to suit the cut. The cut may be made either from the top or from the bottom. The cutter can be placed in either the upper or lower spindle. A peculiar feature about the machine is that the overhanging head is jointed, as will be seen by the shape of the part, although the joint is covered by the belt in the view presented. To change from a surface molder to a variety molder, the rod is disconnected that runs on the incline on the T lever and is pinned up. The housing is then run up by means of the hand-wheel until it stands above the belt line. Then the one spindle is removed and the other substituted, and is set-screwed to the housing. The small table is then turned back under the arm. The shaft that runs the upper pulley is disconnected, and the arm is raised up so that the front portion stands in a vertical position. By this change the machine becomes an edge molder, without having any of its parts unbolted and laid away. The circular which is being issued by the maker shows the device in both positions.



Novelties.—Fig. 8.—Variety Molding Machine, Manufactured by S. J. Shimer, Milton, Pa.

Perfect Plumb Bobs

The Moore & Barnes Mfg. Company, 103 Chambers steet, New York, are putting on the market a line of plumb bobs, which they designate as above, one of which is shown in Fig. 10 of the accompanying illustrations. As will be inferred from the cut, the plumb bob has a screw top through which the cord passes, there being inside a hollow for the knot. These goods are made of bronze, beautifully finished, with fine steel points, and are put on the market as positively accurate. They are made for mechanics' and surveyors' use, the illustration representing, in three-fifths size, mechanics No. 6, weighing 15 ounces. For mechanics' use seven sizes are made, ranging from 1 ounce to 1⅜ pounds, and for surveyors' use, of similar but modified pattern, 9 and 12 ounce. The manufacturers lay emphasis on the absolute accuracy of these plumb bobs, as well as their attractive and artistic appearance.

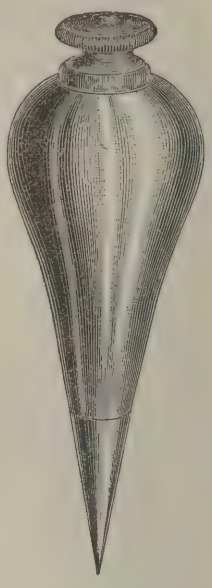


Fig. 10.—The "Perfect" Plumb Bob.

Rowland's Improved Extension Ladder.

A ladder made by David E. Rowland, Canton, Ohio, is designed to meet the wants of builders, painters, tinners, fruit growers and others requiring a long and at the same time light ladder, or ladders, of various lengths. A general view of it is given in Fig. 12, which indicates the special features of its construction, while Fig. 11 gives an enlarged view of one of the automatic fastenings by which it is held at any desired length. These fastenings are attached to the lower end of the sliding section, and will fasten or unfasten themselves at the will of the operator. The point is made that nothing is required of the rope except the raising or lowering of the sliding section. It will be observed that the ladder has adjustable feet by which it can be raised on either side, should the ground on which it stands be uneven. Attention is called to the fact that

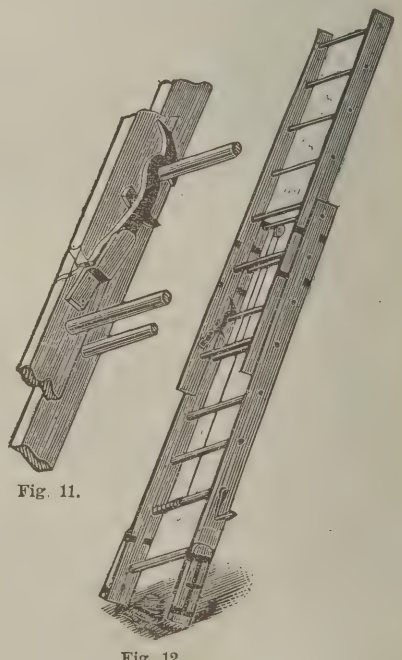


Fig. 11.

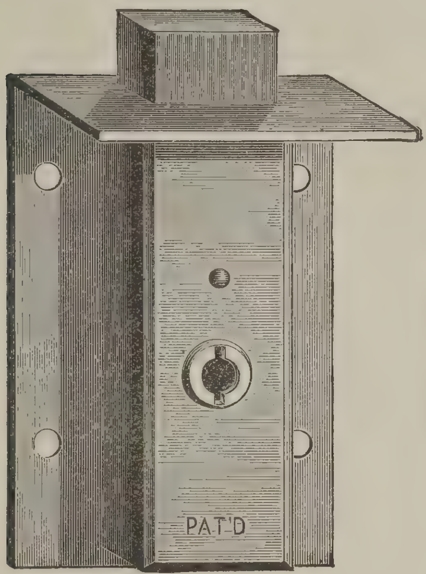
Fig. 12.

Figs. 11 and 12.—Rowland's Improved Extension Ladder.

in some extension ladders the sliding section is extended to the length required before setting them up, thus making them as hard to get up as the common ladder, but it will be perceived that this ladder can be extended to the desired hight when in position. The ease with which the extension is accomplished by means of a crank and rope is also alluded to, and emphasis is laid on the simplicity, convenience, lightness and strength of the ladders. The ladders are made in various sizes.

New Locks.

The Stoddard Lock and Mfg. Company, Saybrook, Conn., have recently been putting on the market a line of cylinder tumbler locks, which are represented in Fig. 13, and



Novelties.—Fig. 13.—*Drawer Lock.*

of drawer, desk and closet locks, shown in Fig. 14. These locks are of brass, and operated by a rack and pinion movement. They contain two tumblers, a variety of combinations, and are alluded to as almost impossible to pick, owing to the fact that a quarter turn of the key is necessary after the tumblers are raised in order to start the bolt. The lock shown in Fig. 13 is designated as No. 250, and is made in sizes ranging from ⅝ to 2½ inches, the measurement being from center of keyhole to top of face-plate. These locks are furnished nickel-plated if desired. The lock shown in Fig. 14 is desig-

Fig. 14 —*Cylinder Tumbler Lock.*

nated as No. 160, and is made in sizes of 1 inch, 1⅜ inches and 1⅞ inches. The manufacturers allude also to the improvement in the form of keyhole. They emphasize the advantage possessed by this line of goods in economizing space to be mortised and the time in applying them.

Box-Board Matching Machine.

In referring to the machine shown in Fig. 15 of the engravings, the makers, S. A. Woods Machine Company, of Boston, New York and Chicago, say that, as will be seen by the cut, it is a radical departure from other devices of its kind heretofore made. They state further that in its con-

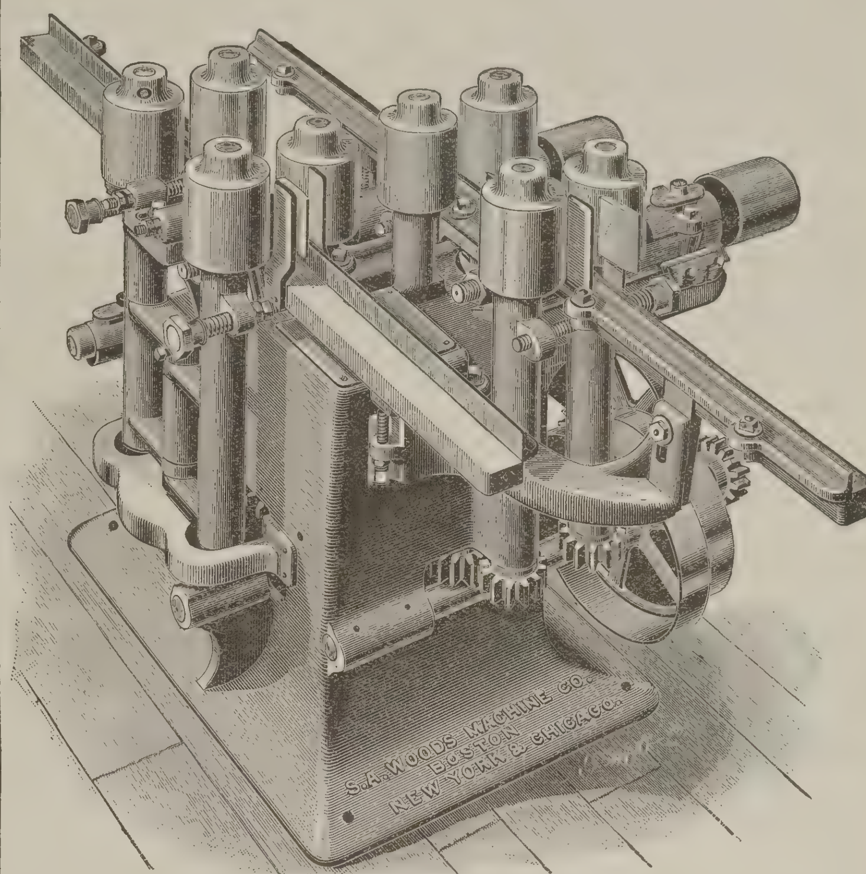


Fig. 15 —*Box Board Matching Machine, Manufactured by the S. A. Woods Machine Co.*

struction they have not omitted to incorporate every important feature necessary to a perfect machine. The frame is cast in one piece in box form. It has a large base, which secures a solid and firm bearing on the floor. Two large cutter arbors are provided, which run in long self-oiling bearings, and which have lateral adjustments by screw to bring the cutters into desired position. The cutters either saw or heads, as the case may be, are on the ends of the arbors, and are held firmly in place by collars or nuts; accordingly, they can be taken off or replaced by others for different work as easily as a common saw. One of the special improvements of this machine is the arrangement of the feed rolls. These are all driven in one direction by gearing placed inside the box frame. One pair of rolls being set forward and one pair in the rear of the center line allows the operator to reach both tables with the same ease and quickness as on the ordinary hand-feed machine. The four inside rolls are fixed, and the four outside rolls are adjustable to various thicknesses of stock. This adjustment ranges from ⅜ inch to 1¼ inches. The feed is driven from one of the cutter arbors, and is regulated by the speed of the same. The tables have vertical adjustments for varying diameters of cutters, and both can be taken off for filing saws or re moving or changing cutters by simply loosening two screws. The guides are full length of tables and have adjustment to line them true with the rolls. There are also guards in front of the rolls to keep the stock in right position to enter the machine. The machine is very compact and all the adjustments are easily made. The tables are so low that one operator can work both sides and keep stock going through both sides of the feed-rolls as fast as the machine will take it. The makers state that their improved spring guide between the rolls will hold the stock firm to the side guides or fences, insuring a perfect cut with both heads. On the tongue side there is put a steel bridge across the gap in the table between the cutters, so that short pieces can be worked without the ends tipping up.

Keystone Laundry Tubs.

We have had much pleasure in examining the new line of laundry tubs known as the Keystone, which are being introduced by Tanner, Keeney & Barkelew, Nos. 90 and 92 Pacific avenue, Jersey City, N. J. The engraving, Fig. 16, shows a two-space tub without any mountings, and indicates, in one particular at least, features of construction. The composition of the material of the tubs is at present, we believe, a

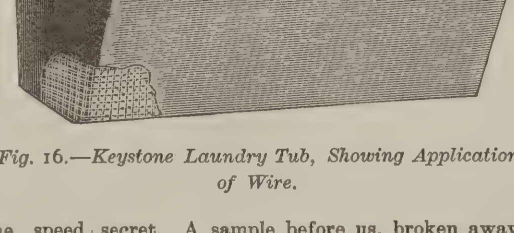


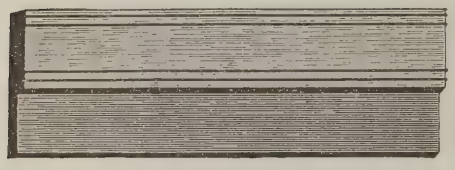
Fig. 16.—*Keystone Laundry Tub, Showing Application of Wire.*

secret. A sample before us, broken away from a tub, shows that the wall is about 1 inch in thickness. It is hard, being probably of the texture of ordinary stone, but the surface takes a polish that is somewhat remarkable in character. From the company's catalogue before us, we learn that the material is not a cement, neither is there any lime in it. It is not a metal, yet we are told that in the process of making the tubs the material is melted and is poured into iron molds. The polished sur-

face of the exterior and interior of the tub is secured by contact with the iron mold. We understand that the facility with which these goods can be manufactured is something remarkable, and that the material is cheap is evidenced by the price at which the tubs are offered, the figures being much lower than are usually demanded for other articles. In order to give the tub all the necessary strength in the process of casting, a wire mesh, clearly indicated in the second engraving by the broken section, is used. The material is thoroughly incorporated in the wire, so as to secure the strength of the latter while retaining the peculiar characteristics of the former. A very interesting model which the company are sending out consists of a miniature single tub, with cast-iron cover, adapted for use as an ink well. It illustrates in a very satisfactory manner the character of the work, and is in itself a veritable curiosity. We understand that very thorough tests have been made of the material with reference to its liability to crack while in use, or by sudden changes of temperature. We are assured that it has satisfactorily withstood the severest tests it has been found possible to apply.

New form of Weather Strip.

Fig. 17 represents a form of rubber strip which D. W. Bosley & Co., 273 East Madison street, Chicago, Ill., are putting upon the market. The special features to which attention is directed in the circular before us is the shape in which it is manufactured,



Novelties.—Fig. 17.—Weather Strip, Manufactured by D. W. Bosley & Co., Chicago, Ill.

an idea of which is afforded by the engraving. It will be noticed that the upper portion is thicker than the lower portion, thus affording a good and sufficient means for attaching to the door or window against which it may be applied. The lower portion, being flexible, serves as an apron to exclude the cold. Among the advantages to which the manufacturers direct attention may be mentioned that there is no sawing necessary in putting this weather strip in place. It comes in rolls, and is cut to length very readily with a pair of shears or knife, whichever may be most convenient. It is put up by nailing through the upper portion.

Low Fireplaces.

Writing upon the subject of low fireplaces, Dr. Neil Arnott says: "The supposition that fuel burnt in a low fire gives out more heat has arisen from the experimenter not reflecting that his hand held over the low fire feels not only the heat radiated from the fire itself, but also that reflected from the hearth close beneath it, which second portion, if the grate were high, would have room to spread or radiate downward and outward to the more distant floor or carpet, and to warm them. The notion that the fire, because near the floor, must warm the carpet more, springs from what may be called an error in the logic of the reasoner, who is assuming that the hearth, floor, and carpet, being parts of the same level, are in the same predicament, the truth being, however, that in such a case the portion of the hearth which is within the fender gets nearly all the downward rays, and the carpet almost none—as a candle held before a looking-glass at a moderate distance diffuses its heat pretty uniformly over the whole, but if moved close to one part of the glass it overheats and probably cracks that part, leaving the rest unaffected. A low fire on a heated hearth is to the general floor or carpet of the room nearly what the sun, at the moment of rising or setting, is to the surface of a field. from the surface, and the few which ap- The rays are nearly all shooting upward proach it slant obliquely along, or nearly parallel to, the surface, without touching, and, therefore, without warming it. Striking proof of the facts here set forth is obtained by laying thermometers on the floors of a room with a low fire and of a room with a fire, as usual of old, at a hight of about 15 or 16 inches above the hearth. An experiment tried in two such rooms, in both of which thermometers on the pianofortes, four feet above the floor, stood at 62°, showed the carpet not far from the hearth to be at 56° with the low, and at 73° with the high fire.

Rules for Lightning Conductors.

We add to the numerous articles which have appeared recently with reference to the management and construction of lightning conductors a code of rules which represents the practical outcome of the joint conference of the British Meteorological Society, the Royal Society of British Architects and the Telegraph Engineers, the Electricians, and the Physical Society. This code of rules is the result of years of inquiry on the part of the leading electrical engineers, physicists and architects of the times, and may be said to cover the latest and best experience, to embody the most authority, and if carried into effect, prove a safeguard for buildings against damage by lightning.

POINTS.

The point of the upper terminal should not be sharp—not sharper than a cone of which the hight is equal to the radius of its base. But a foot lower down a copper ring should be screwed and soldered on to the upper terminal, in which ring should be fixed three or four sharp copper points, each about 8 inches long. It is desirable that these points be so platinized, gilded, or nickel-plated as to resist oxidation.

UPPER TERMINALS.

The number of conductors or points to be specified will depend upon the size of the building, the material of which it is constructed, and the comparative hight of the several parts. The number will be determined by the fact that a lightning-rod protects a conic space whose hight is the length of the rod and whose base is a circle having its radius equal to the hight of the rod. It must be borne in mind that even ordinary chimney stacks, when exposed, should be protected by short terminals connected to the nearest rod, inasmuch as accidents often occur owing to the good conducting power of the heated air and soot in the chimney.

INSULATORS.

The rod is not to be kept from the building by glass or other insulators, but attached to it by metal fastenings.

FIXING.

Rods should preferentially be taken down the side of the building which is most exposed to the rain. They should be held firmly, but the holdfasts should not be driven in so tightly as to pinch the rod, or prevent the contraction and expansion produced by changes of temperature.

FACTORY CHIMNEYS.

These should have a copper band round the top, and stout, sharp copper points, each about 1 foot long, at intervals of 2 or 3 feet throughout the circumference, and the rod should be connected with all metallic masses in or near the chimney. Oxidation of the points must be carefully guarded against.

ORNAMENTAL IRONWORK.

All vanes, finials, ridge ironwork, &c., should be connected with the conductor, and it is not absolutely necessary to use any other point than that afforded by such ornamental ironwork, provided the connection be perfect and the mass of ironwork considerable. As, however, there is risk of derangement through repairs, it is safer to have an independent upper terminal.

MATERIAL FOR ROD.

Copper, weighing not less than 6 ounces per foot run, and the conductivity of which is not less than 90 per cent. of that of pure copper, either in the form of tape or rope of stout wires—no individual wire being less than No. 12 B. W. G. Iron may be used, but should not weigh less than 2¼ pounds per foot run.

JOINTS.

Although electricity of high tension will jump across bad joints, they diminish the efficacy of the conductor. Therefore, every joint, besides being well cleaned, screwed, scarfed, or riveted, should be thoroughly soldered.

PROTECTION.

Copper rods to the hight of 10 feet above the ground should be protected from injury and theft, by being inclosed in an iron pipe reaching some distance into the ground.

PAINTING.

Iron rods, whether galvanized or not, should be painted. Copper ones may be painted or not, according to architectural requirements.

CURVATURE.

The rod should not be bent abruptly around sharp corners. In no case should the length of rod between two points be more than half as long again as the straight line joining them. Where a string course or other projecting stonework will admit it, the rod may be carried straight through, instead of round the projection. In such a case the hole should be large enough to allow the conductor to pass freely and allow for expansion, &c.

EXTENSIVE MASSES OF METAL.

As far as practicable it is desirable that the conductor be connected to extensive masses of metal, such as hot-water pipes, &c., both internal and external, but it should be kept away from soft metal pipes and from internal gas-pipes of every kind. Church bells inside well protected spires need not be connected.

EARTH CONNECTION.

It is essential that the lower extremity of the conductor be buried in permanently damp soil; hence proximity to rain-water pipes and to drains is desirable. It is a very good plan to make the conductor bifurcate cloe sbelow the surface of the ground, and adopt two of the following methods for securing the escape of the lightning into the earth: A strip of copper tape may be led from the bottom of the rod to the nearest gas or water main—not merely a lead pipe—and be soldered to it, or a tape may be soldered to a sheet of copper 3 feet by 3 feet and $\frac{1}{16}$-inch thick buried in permanently wet earth and surrounded by cinders or coke, or many yards of tape may be laid in a trench filled with coke, taking care that the surfaces of copper are, as in previous cases, not less than 18 square feet. Where iron is used for the rod a galvanized-iron plate of similar dimensions should be employed.

Some recent German experiments have given interesting results as to the action of frost on hydraulic mortars and cements when these materials are mixed with water containing different percentages of salt. In making the experiments a series of stone cubes of about 2.4 inch edge were united with cement, which in one case was mixed with pure water and in other cases with water containing from 2 to 8 per cent. of salt. While the cement was still fresh, these blocks were placed in the open air, and exposed for a period of 21 days to a temperature varying from 20° to 32° F., after which they were kept for a further period of 7 days in a warm room. At the end of this time the joints were tested, with the result, we are told, that the cement mixed with pure water was completely disintegrated, having no holding power; the cement mixed with water containing 2 per cent. of salt was somewhat better, though the results obtained with it could hardly he considered satisfactory; while that mixed with the 8 per cent. solution was uninjured by the exposure.

MASONRY.

Masonry and Stone Cutting.

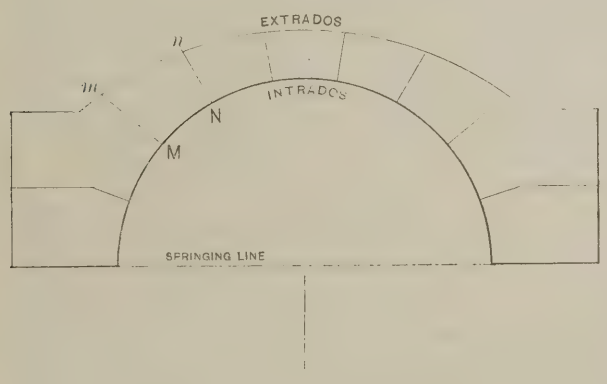
The subject of masonry and stone cutting is one to which very little attention has been given so far as text-books are concerned. We believe we are safe in saying that there is no really good English text-book in existence relating to this subject. Very recently it has attracted marked attention in Great Britain, and in addition the different trade schools in England and this country have created an inquiry for books and articles bearing upon the subject. Mr. Lawrence Harvey, of the City Guilds Institute, South Kensington, has given particular attention to stone cutting, and has conducted a number of classes in it. A series of lectures which he has recently delivered will, we think, be likely to interest our readers, and accordingly we propose reproducing a part of them in these pages. The first is as follows:

The art of masonry comprises the solution of two questions:

1. Which are the shape and the dimensions a stone structure should have to insure its stability, and to satisfy the requirements of taste and convenience?

2. The shape and dimensions of a structure having been determined beforehand, how to produce the structure out of an aggregate number of blocks of stone of moderate size and of such shape that, placed side by side in a given order, they will support one another as if the whole structure consisted of one single stone?

The first question depends on the laws of statics, on the toughness of the stone used, on the artistic rules of architecture. This is, therefore, a vast subject of study, which includes nearly all the science of construction and the history of architecture. For this reason we do not intend to treat this part of our subject, but will confine ourselves to the second question only—viz., the scientific operations of stone-cutting, or the methods by which the mason obtains, from the designs of the architect, the exact shape of each stone in a building, so that when set in its place it shall exactly fit the adjacent stones without previous reference to them.



Masonry and Stone Cutting.—Fig. 1.—Diagram of a Vault.

THE SCIENTIFIC OPERATIONS OF STONE-CUTTING.

The masonry of walls and trabeated architecture is of so simple a character that it offers no interesting geometrical operations, and we beg to begin at once by studying the construction of vaults.

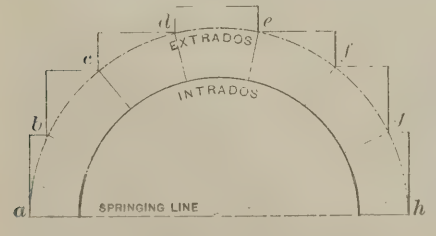


Fig. 2.—Vault Formed in a Body of Masonry.

The scientific operations of stone-cutting then comprise three problems:

1. To find the most advantageous system of voussoirs to subdivide a given vault

2. To determine the arrises and the true shape and dimensions of every face of the voussoirs. The limits of these faces are, of course, the intersections of the divers surfaces given by the former operation.

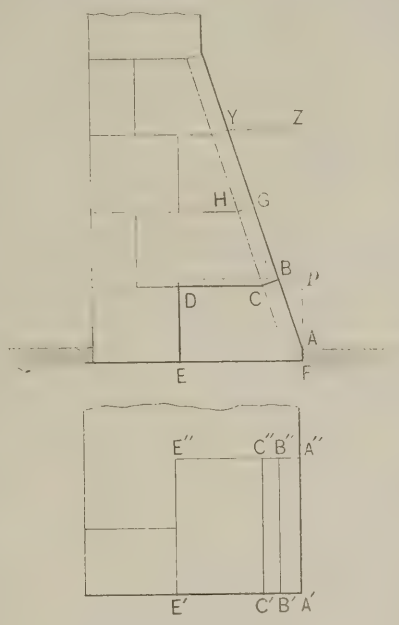


Fig. 3.—Battering-Wall.

3. To apply the lines found to working the stone, so that the stone be cut to the shape given by the working drawings.

The first of these operations, or the system of the division in voussoirs, differs according to the shape of every vault; but there is one general rule which must be followed as much as possible—viz., the joints (that is, the faces of the voussoirs which come into contact with one another) must be made normal to the intrados of the vault—that is, must be in every point made perpendicular to a plane tangent in that point to the inner surface of the vault. It is evident that, if this condition be not fulfilled, of two contiguous voussoirs the one would present an acute angle, the other an obtuse angle, and the first would inevitably be broken off by the pressure of the latter, and thus disfigure the inner surface of the vault. This might even sometimes endanger the stability of the structure.

To carry out the second operation, the intended vault has to be delineated, full-size, on a platform prepared for that purpose. The utmost accuracy is required in making these full-size drawings; the method and means for producing them are fully explained in Mr. Dobson's very short treatise of masonry, to which we beg to refer our readers. This done, the arrises which form the outline of every face of each voussoir, are determined in projection; then the stonemason gets the real size and shape of these faces by the methods usual in practical geometry. He turns down the faces which are plane, and he develops such faces as are developable: by these means the molds, templets, and bevels required for working the stone are obtained.

So as to clearly understand the terms we shall employ hereafter we beg to give a few definitions, some of which refer only to the words we use in this paper.

Each one of the stones, which compose either an archway or a vault, is called a voussoir.

In each voussoir the soffit is the face which forms part of the interior surface of the archway or vault; the bed joints, or beds, are the faces *M m*, *N n* (Fig. 1) on which the voussoirs of one course bear upon the voussoirs of the course immediately below them, whereas simply the joints are the faces in which two voussoirs of the same course come into contact. The head of a voussoir is the name we shall give to the face thereof which appears on the front wall or face of an archway. We shall also, for convenience sake, use the words "back" and "top" for the faces of the voussoir which come in contact with the masonry of the wall supported by an archway or a vault.

In a vault the interior surface is called the intrados, but more commonly the soffit; and the exterior surface (Fig. 1) is the extrados, when such a finish exists. When the vault is comprised in a body of masonry, as in an archway pierced through a wall (Fig. 2) there is no real extrados, but the backs of the voussoirs are cut to fit in with the horizontal courses of the stone wall; the name of "extrados" is then given to an ideal surface, shown by dotted line, which would connect the extremities *a*, *b*, *c*, *d* of the bed-joints of each voussoir. The jambs are the sides of an aperture or an archway; but the more general term of piers will be given to whatever structure, wall, pillar or pilaster supports a vault. The springing line is the lowest level where the vault begins, and we shall call the springer the lowest voussoir next the springing line. In segmental vaults and flat arches we shall give the name of abutment to the highest stone of the jamb, because it resists the lateral pressure of the vault; but in semi-circular vaults and others, which simply rest on their piers, we shall call impost the stone immediately below the springing line. All rocks are either sedimentary or igneous. Limestones and sandstones belong to the

Fig. 4.—A Bad Bed Joint.

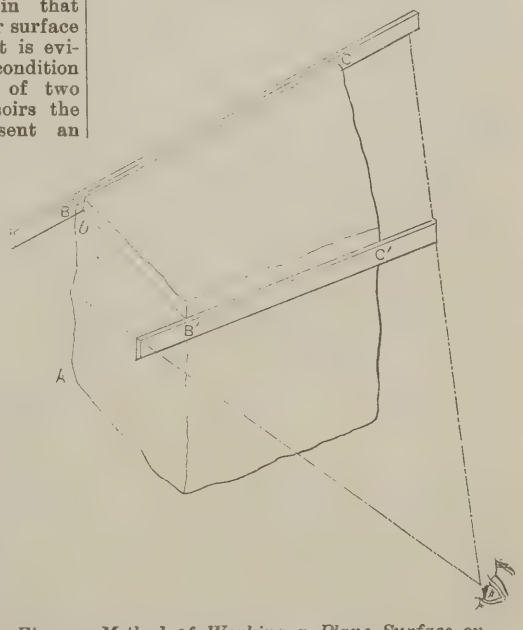
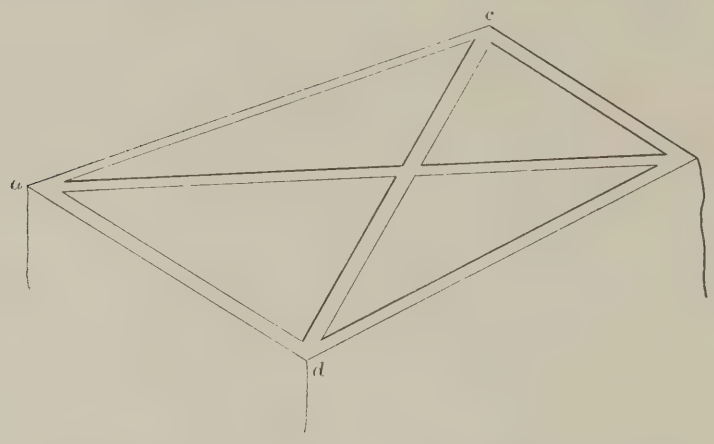


Fig. 5.—Method of Working a Plane Surface on Blocks of Moderate Size.

former, granites to the latter. In quarries of sedimentary stones the strata are generally separated by parallel surfaces, and in extracting the stone rough pieces are obtained, in which the quarry-beds are nearly plane faces. Whenever stone is employed in building it is important to keep the quarry-beds perpendicular to the direction of the pressure the stones will have to sustain, because the resistance of the stones is in that



Masonry and Stone Cutting.—Fig. 6.—Method Employed Where the Surface is Extended.

direction at its greatest to meet the crushing weight to which it is submitted. In a wall, for instance, the quarry-beds should be horizontal; in a vault, the quarry-beds must either coincide with one of the bed-joints of the voussoirs, or form equal angles with both their bed-joints. The reverse holds good when the stones are submitted to flexion, as in architraves. In that case the stone offers a much greater resistance when its quarry-beds are placed vertically, as was practiced by Greek, Roman and Mediæval masons.

The foremen of stone-cutters makes out the full-size geometrical drawings required, and directs the workmen in applying the results of his drawing, molds, templets and bevels to the cutt ng of the stones. He also marks out each stone, when cut, with certain signs or face marks (in Fig. 8 we give the signs used by the French masons), so that the foreman who directs the laying of the stone may know which are the lower and the upper bed-joints. The face marks are not to be confounded with the ordinary marks which masons use in lieu of signature.

BATTERING-WALL.

To explain the operations of stone cutting more easily we have taken for our first example a simple battering-wall, which offers no complex arrangements of masonry whatever. A wall is said to be battering, or on the batter,

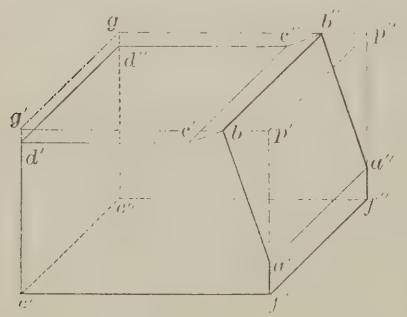


Fig. 7.—Working the Lower Stone Required for the Battering-Wall.

when its face is not vertical (Fig. 3). The angle of the batter is measured from the plumb line; for instance, in Fig. 3 the batter is the angle Y A Z. This angle is not usually given in degrees, but by the proportion between Y Z and A Z, such as 1 foot in two, or 3 inches to the foot, &c. In our drawing we make the batter of 4 inches to 1 foot rise, or one-third.

If (Fig. 3) the horizontal bed joints were carried through to the battering face of the wall, the lower arrises of the stones would be sharp, the upper ones obtuse. To avoid this defect the horizontal bed-joints are stopped at a distance of 2 inches or 3 inches from the battering face, and the ends of the joints are made perpendicular to the face of the wall, as in B C and G H.

As we have said before, sharp angles should be avoided; yet there are cases where the treatment necessary to obtain right angles is nearly as objectionable as sharp angles. In Fig. 3, for instance, the lower bed joint of each stone presents a projecting angle which has to fit exactly in the inner angle of the stone below it; such joints are rarely perfect, so that the stone most often will bear on a few points, as in Fig. 4, instead of bearing on the entire surface of the bed-joint. In this case the mason should allow for a wide joint on the face

Fig. 8 —French Face Marks.

of the wall, to prevent the stones bearing on the outer edge of the bed-joints, the joints to be filled up with cement after the work is completed. The architect will avoid giving the mason these difficulties if he will adopt a V-jointed rustication instead of a wall with a plane face, and this will, of course, be a more economical design to carry out than the former.

Before explaining the operations for cutting the stones of a wall we must begin to show how a plane surface is worked on rough stones, such as are extracted from quarries.

Fig. 5. The blocks of stone extracted from quarries are in the shape of rough prisms. If they be of moderate size, the workman can proceed, as shown in Fig. 5 On the back face, A B C, and close to the upper-edge, he will draw with the help of a straight-edge a line, B C. This line will not be straight on account of the irregular surface of the rough stone, but it will be contained in a plane. Then with the chisel and mallet, a draft or narrow ledge is cut along that line, the depth B *b* of this draft to be about ¾ inch, and to be accurately worked to a plane. This done, the workman places his straight-edge upright on the ledge of the draft he has made; he will then place against the opposite face of the stone another straight edge, so that its upper edge coincides exactly with the lower edge of the first straight-edge, when sighted from a distance. He will then cut another chisel draft along the line B′ C′ marked by the second straight-edge. These two chisel drafts are, of course, in the same plane, and the workman has only to remove the superfluous stone which divides them, until the surface coincides in every part with a straight-edge. This he does by connecting the two first drafts by a draft B B′, and following on cutting away the stone so that a straight-edge resting on the two opposite drafts should touch the whole intervening surface.

To form a plane surface, when the surface is of considerable size, two diagonal drafts, as *a b*, *c d* (Fig. 6), are produced across the surface, and connected by cross drafts, as *a d*, *c b*. The superfluous stone is then knocked off between the drafts.

In working a block of stone, the workman begins by bringing to a plane surface one of its largest sides, usually one of the beds. Without any further explanation, the reader will easily conceive how another face, perpendicular to the first, can be produced by sinking across its ends chisel drafts with the help of a square, then working this second face between the drafts.

(Figs. 3, 7). Now, let us see how we will work the lower stone of the wall (Fig. 3). The elevation of this stone is shown (Fig. 3) by the outline A B C D E F, and its plan placed below the elevation is contained within the rectangle A′ A″ E″ E′.*

A stone will have to be selected from the quarry, the base of which will be equal to the plan A′ A″ E″ E′, and the hight of which will be equal to F *p*, but all the surfaces of this stone need not be worked, for, as some of them will have to be cut away, this would entail a waste of labor. The workman (Fig. 7) will begin by forming the lower face of the stone which is to become the bed-joint of the same. He will draw thereon the rectangle *f′ f″ e″ e′* exactly equal to the plan of the stone; he will then work the face *f′ e′ q′ p′*, which is perpendicular to the bed-joint. This done, he will draw on that face the outline *a′ b′ c′ d′ e′ f′* identical to the elevation of the stone. After this by the help of a square the workman can cut all the faces of the stone perpendicular to the face last worked. He will finish the stone by measuring on the last worked faces a distance equal to A′ A″, which will give him the arrises of the end face, which he will then be able to cut.

This method for cutting the stone would answer; but, in our opinion, it would be safer to begin by also dressing the back plane, *f″ e″ q″ p″*, and marking thereon the outline of the elevation. In that case the other faces can be worked with a straight edge guided by the arrises of the outline. When, as in a wall, many stones have to be similarly worked a mold cut out by the foreman to the shape of the elevation is generally used. Of course, the method indicated for cutting the stones of the lower course applies equally to the stones of the courses above. The geometrical operations required to obtain a stone of a given shape out of a rough block are simple enough; but we beg to point out that much judgment is required to cut out the stones so as to waste as little material as possible, and a good foreman of masons can save his employer large sums of money.

(To be continued.)

Writing on the subject of wall papers, O. Jones presents the following considerations: "The prevailing colors of the walls of rooms hung with printed paper should, of course, vary with the character of the room and the aspect. Halls and staircases look well hung with green, because the eye on entering a house is generally fatigued with the strong glare of daylight and the green is the most refreshing. Studies and dining-rooms look well with dull reds in diapers or flocks, and may be enriched with gold; these form good backgrounds for engravings or pictures, but the reds or greens must never be positive colors, but low-toned and broken, so as not to disagreeably impinge upon the eye. In drawing-rooms, where the paper has to do more toward furnishing

* Observe that two points or more may be projected in elevation on one point only, for instance, the points A′ A″ on plan have both for elevation the point A. Likewise two points in elevation A and F may have for plans only one point A′. Thus a point is only completely defined when both its projections are named, such as point (A, A′) or point (F, A″); but for shortness sake we will often be content with defining a point by its sign on the plan, and call it the point A′ or E″, thereby meaning the point itself in space.

and beautifying a room, they may be more gay; almost any tone and shade of color hightened with gold may be used, provided always that the colors are so arranged and the forms so interwoven that a perfect balance be obtained, and the eye never attracted to any one portion."

How Chinamen Make Glass.

Consul Withers, writing to the State Department, says of Chinese glass making:

"The Chinese in Hong Kong manage to turn out a considerable quantity of glassware of various kinds and of fair quality, with the minimum of implements and a plant the most inexpensive. True, the material in general use is old glass remelted, for which expensive furnaces and apparatus are not indispensable. The crucibles used are small, rarely exceeding in capacity 200 pounds. These are set in a furnace stoked from a small opening in the side. About 3 cwt. of coal is used in melting one crucible of glass. The tubes by which the molten glass is collected from the pot are perceptibly lighter and shorter than those used in America. After being blown, the glass is annealed in a small square pit containing ashes and straw, the latter being speedily converted into ash by contact with the heated glass. The molds used are made of clay and are often very ingeniously devised to meet the varying indications required. When taken from the crucible the operator does not marver the lump of molten glass by rolling on a flat iron slab as is usually done. They have, in fact, no marver's tools or other appliances usually seen in glass-blowing establishments. A small trowel-shaped tool of iron, clay molds, and a few iron tubes constitute the Chinese glass-blower's whole stock in trade. The above relates to Chinese glass-blowers alone, of whom there are many in the colony, but there is a large plant for the manufacture of glass, owned by English and foreigners, in Hong Kong, which has all the modern appliances, but is not now at work."

Testing Exterior Stains.

Every one who employs stains on exterior woodwork is interested in knowing the quality of the material and means that may be employed for determining the actual value of the stains. Since the use of stains has become so general, both good and bad stains are upon the market; accordingly a few points on estimating their comparative values will interest our readers. The nose, and to a less degree the eye, are admirable allies for the work—but, unassisted, they are not infallible. Assuming that some samples have been bought in the open market, so that it is not known that they are to be subjected to a trial, the following is about the simplest method of testing:

1. Search for kerosene by warming and then noting the smell. Also note the thinness and lack of covering power which kerosene causes. Kerosene is simply a cheapener.

2. See how fine it brushes out on a smooth shingle. There should not be the slighest grit or any perceptible grains of pigment, the presence of which will prove that the coloring was mixed dry with the vehicle and was never ground fine.

3. Pour out some of the stain in a tumbler. If it begins to settle at once, except in the case of a chrome yellow or green, it is made as above stated, by mixing a dry paint with the vehicle, and therefore should be avoided.

A well-ground oil stain tested in this way held up a whole day, and a creosote stain a day and a half. Of course when debating between two stains it is best to try them side by side. In such a case the comparative color-strength may be determined by diluting equal quantities of both stains of about the same shade with equal quantities of turpentine and then applying the diluted colors to wood and noting the depth of color. One part of stain to ten parts of turpentine is a good strength.

TRADE NOTES.

THE NEW YORK LUMBER AND WOOD WORKING COMPANY have recently moved their general office from 26 Cortlandt street, New York, to 173 Broadway. The entrance to their office is from 2 Cortlandt street. In another part of this issue they present an engraving of recent work which they have executed, being a portion of a finish of a very attractive block of houses in the upper part of the city, and which has been engraved from a photograph. The company are among the most extensive operators in their line in the United States.

THE CHARLES W. SPURR COMPANY, whose office and warerooms are at the foot of East Tenth street, New York City, have a very appropriate and attractive exhibit at the American Institute Fair, New York. The Spurr paper veneers are shown in great variety applied to interior decoration and a number of panels of carvings, which are a specialty with this company, are displayed. The exhibit attracts marked attention.

WE HAVE RECEIVED from the Massachusetts Institute of Technology a description of Course IV, which is that of the Department of Architecture. The course in architecture extends through four years and is very complete. The list of studies is given and a careful description of the course, in detail, is presented. The instructors having special charge of the course in architecture are named. Those of our readers who are interested in matters of this kind will do well to address the Institute, Boston, for a duplicate of the circular.

F. W. DEVOE & CO., of 103 Fulton street, New York, have recently issued an exceptionally handsome priced catalogue of artists' materials. It contains 400 pages, is profusely illustrated and elegantly bound in cloth, gilt lettered. The contents comprises a most complete list of colors and brushes, besides a very full line of articles used in sculpture, wax flower-making, stenciling, porcelain and china painting, tapestry painting, fresco and scene painting, etching, reprousse work, textile designing, &c. The work is one of the most complete of its kind we remember seeing.

WE HAVE RECEIVED from the Venetian Blind Company, of Burlington, Vt., some samples of wood work, which astonish us not a little. The samples are portions of slats, such as might be used in English or American venetian blinds, and which are marvels of finish, so far as their surface is concerned. But the marvel increases when we are informed that the pieces of wood, as shown, are just as they come from the machine, and are not sand-papered or polished in a subsequent operation. We are not made acquainted with the details of the machine by which this work is done. We are assured, however, that it is something peculiar in wood-working practice, and, in evidence of this, some of the shavings which the machine makes are sent us. These are from 1½ inches to 2 inches wide, and measure from 1 to 3 yards in length. They might be taken for veneers. They resemble in texture the finest corn husks. They are silky, yet have the fiber of the wood. The specimens before us include pine, mahogany, and other woods. The mahogany has a peculiarly soft feel to it. The company are makers of English and American venetian blinds, and are also introducing Hill's inside sliding blinds. We have no doubt that they would be glad to send to any of our readers who apply for the same a small bit of wood finished by the process above described. It would be an excellent specimen of the quality of the finish applied to blinds, a matter in which many of our readers are interested.

I. P. FRINK, of No. 551 Pearl street, New York, recently supplied for the West Harlem Methodist Episcopal Church a massive reflecting chandelier of special design. The chandelier measures 18 feet 4 inches, from the brass ball at the end of the stem to the plate at the upper extremity of the stem, and weighs 600 pounds. It contains 150 lights. The gas burners are made to resemble candles. The lower circle contains 80 burners, and is surmounted by a silvered glass reflector. Above this circle and the reflector are 10 clusters of lights, each made up of seven gas burners. The gas is lighted by electricity. The chandelier is richly ornamented in polished brass and old gold, and is a handsome embellishment to the room in which it hangs and also a credit to the maker.

THE ADVANCE SHEETS of a new catalogue of wood carvings, issued by Charles W. Spurr Company, foot of East Tenth street, New York, are at hand. These carvings, a few of which have already appeared in our columns, are made from the veneers with which the name of Mr. Spurr has been associated for a long time past. The wood is pressed into shape in dies and is afterward reinforced by a peculiar preparation and treatment. A long list of the woods, both native and foreign, in which these carvings are prepared, is given in the preface, and near the close of the pamphlet a statement is made concerning the uses to which these ornaments may be applied. The range is wide and the carvings are undoubtedly of interest to every architect, builder, and mechanic whose eye chances to rest upon this paragraph. The catalogue contains some very excellent engravings and is a desirable addition to an architect's collection.

A CIRCULAR has been issued by Henry Martin, of Lancaster, Pa., to the effect that the brick machine business which he has conducted for many years past will hereafter be carried on by the Henry Martin Brick Machine Mfg. Company. The reasons that lead to this change are that the business has become so large that it could not be satisfactorily conducted by a single individual. The desire also existed to relieve the inventor of some of the details of direction and enable him to devote more attention to the wants of the trade.

WE HAVE RECEIVED from Reed & Auerbacher, No. 229 Bowery, New York City, an illustrated price list of S. J. Addis' London carving tools. Wood carvers have long since learned to regard Addis' tools as being the best for every purpose, and hence this catalogue issued by a firm that make a specialty of tools of this particular make is of more than passing interest.

CONSTABLE BROTHERS, engineers and architects, No. 149 Broadway, New York, we are informed, have been engaged by A. P. Mann, Esq., to revise the plans and superintend the building of a large cottage, now partially completed, near Far Rockaway. The estimated cost of the work is in the neighborhood of $13,000.

IN THE OCTOBER NUMBER of *Carpentry and Building* we presented a set of drawings designed by a lady; but, unfortunately, the type made us give her name incorrectly. A "c" was substituted for an "r." The name is Miss Minnie M. Parker, 1614 Green street, Philadelphia, Pa.

THE WESTERN SAND BLAST COMPANY, northwest corner Clinton & Jackson streets, Chicago, Ill., are directing attention to their ornamental glass work for vestibule doors, transoms, office counters, &c. The company also manufacture advertising glass signs, which are very attractive in their way.

IN OUR NOTICE of the Tolman roofing bracket in the last issue, we inadvertently used the term strap iron to indicate the material out of which it is constructed. We suppose this occurred from the fact that iron and steel in many instances are synonymous at the present time. The bracket in question instead of being made of ordinary strap iron is made of spring steel, and we are glad to direct our readers' attention to this fact. The article is furnished by Snow & Van Vleck, 90 Chambers street, New York.

THE CHICAGO MORTISING MACHINE COMPANY, 123 and 125 West Washington street, Chicago, Ill., are introducing the Douglass chain mortising machine, a device which

works freely in hard or soft wood. No boring or cleaning out of the mortise is necessary. An illustrated circular is offered to all applicants.

THE GEM SAW FILING COMPANY, Post Office Box 1507, New York City, are introducing Cook's saw filing attachment. This is a gauge for attaching to a file to indicate the angle at which the file is being held. A graduated plate is used which is always in plain view of the operator. The device is ingenious and will no doubt interest many of our readers.

WE HAVE RECEIVED from the New England Terra Cotta Lumber Company, a copy of what they style "The Builder's Hand Book." It treats of the application of porous earthenware in incombustible architecture. The book is illustrated with numerous diagrams, and contains much that is of interest to builders and designers. The first page is devoted to a reprint of the *Chronicle's* fire tables, showing the comparative number of dwelling-house fires by principal causes. From this it appears that defective flues are by far the most numerous. The construction that this company is furnishing is calculated to overcome this danger with others.

THE BARNES TOOL COMPANY, of New Haven, Conn., referring to their self feeding hand sawing machine, an illustration of which appears in their advertisement in another column, mention that 1000 of these machines are at present in use. This would seem to be a very satisfactory testimonial as to the character of the device.

THE SIMONDS MFG. COMPANY, of Chicago, Ill., and Fitchburg, Mass., are directing attention to their very complete line of saws, including everything that wood-workers require, and also to their line of planing knives and other similar tools. This company secured four gold medals at the New Orleans Exposition.

THE SAGENDORPH IRON ROOFING AND CORRUGATING COMPANY, of Cincinnati, in their card in another part of this issue very happily show in small space the numerous styles of roofing and manufactured sheet-metal work which they are supplying.

GEORGE UPTON, 239 Franklin street, Boston, Mass., is directing attention to Upton's liquid glue, a sticker adapted for use with wood, leather, glass, paper, &c. Samples, we believe, are sent by mail.

THE FAIRHAVEN MFG. COMPANY, Fairhaven, Mass., are directing attention to the Universal wood-working machine, which they are supplying, and which they claim is unexcelled for mortising, boring, variety and inside panel, molding panel, raising and other similar kinds of work.

IN THEIR ADVERTISEMENT, which appears in another part of this issue, the Cortright Metal Roofing Company, of Broad and Race streets, Philadelphia, and with Western office No. 1007 Walnut street, Kansas City, Mo., present the Shield pattern tiles, as they appear laid on a roof, and also a group of the new Gothic shingles, with an enlarged view of the side lock of the Gothic shingle.

THE NEW PAMPHLET issued by the New York, Lake Erie and Western Railroad Company, through its passenger department, entiled "Suburban Homes on the Picturesque Erie," may be described as being arranged on the co-operative plan. While it contains much matter of the usual kind that is put out by railway companies, regarding the sites for suburban residences along the line, it also presents plans prepared by the Co-operative Building Plan Association. It is evidently intended to advertise locations, and at the same time to suggest designs of houses to be built upon those locations. The pamphlet is a very attractive one and is gotten up in excellent style.

EVERY ONE who has attended an industrial fair of late years, even though his memory goes back of the great Centennial Exhibition of 10 years ago, will remember the "Mohawk Dutchman," whose ingenious and skillful sawings always attract a crowd whenever his machine is in operation. We have recently received a communication from Mr. McChesney, whose pseudonym we have quoted above, on the subject of sawing machines and sawing appliances, which we regret we have not space to publish in full. The essence of his communication is that although a man may be thoroughly acquainted with the use of band saws he cannot accomplish the results which the writer accomplishes unless supplied with the proper tools. Without giving any preferences as to band sawing machines he expresses a preference for blades, and asserts that since 1883 he has used only the Simonds blade in exhibition work. He says these blades are of such quality that he can always count on them. Sawing only in public, he says he cannot afford to take any chances with reference to the tool giving out or breaking. The blades in question are manufactured by the Simonds Mfg. Company, Fitchburg, Mass., and Chicago, Ill.

WE HAVE RECEIVED from the Gurney Hot-Water Heater Company, No. 237 Franklin street, Boston, Mass., two illuminated hangers, illustrating the application of the apparatus which they are manufacturing. One of these purports to be a vertical section through a house, and illustrates kitchen and heater room, front hall and parlor, together with several chambers, and shows radiators of different types and kinds in place, while the accessories indiate that the temperature is comfortable in the extreme. The smaller of the two hangers illustrates the heater, first, by means of an elevation showing the connections, and, second, by a partial section showing how the apparatus can be cleaned, so far as the flues and horizontal surface sections are concerned. The hangers are in colors, and are attractive in general design.

THE CINCINNATI MOLDING COMPANY, of Cincinnati, Ohio, direct attention to a change of address from 375 West Third street to No. 60 Riddle street. This company are at present producing over 100 styles of carved moldings of a kind to interest builders and decorators.

W. R. KINNEAR & CO, of Columbus, Ohio, are gaining a well merited reputation for artistic treatment of interior decorative sheet-metal work. Their last production in this line of work since they placed in position the ceiling in the court room and other parts of the new courthouse at Columbus is the ceiling and proscenium arch of the Grand Opera House in that city. While the amount of surface covered in this case did not permit of the use of as diversified patterns as were possible to employ on the courthouse, the treatment is described as being quite elaborate, and, in some respects, superior to the former work. The center piece, from which depends the immense chandelier, is a particularly notable piece of work.

THE THORN SHINGLE AND ORNAMENT COMPANY, of Twelfth and Callowhill streets, Philadelphia, we are informed, are meeting with very great success in the introduction of the roofing specialties which they are manufacturing. A very complete line of goods is offered for the attention of architects and builders.

FRANK MESKER and Henry F. Edwards, assignees to Mesker & Brother, all of St. Louis, Mo., have recently been granted a patent on a sheet-metal column. The column described in the patent specification is of the character commonly used in architectural work, such as building fronts. It is light, strong and capable of being ornamented as desired, and is at the same time adapted to being safely and economically transported. It consists of a combination of sheets of iron and angle iron, suitably disposed and united. The sheets constitute the sides of the column, and the angle irons are used at the front and corners, respectively, of the column upon the outer side of the sheets, one flange of the angle iron lapping upon the column side, and the other flange of the angle iron lapping upon the column front, thus serving not only to unite the sheets, but to protect the joints from the weather. There also results a panel upon the column front, which is further emphasized by appropriate ornamentation at the top and bottom. A novelty of this construction which our readers will appreciate is the fact that the angle irons used for strength in this construction instead of being applied inside of the sheet metal are used on the outside, thereby securing a protection to the corners and a stability that would not otherwise be attained. The back of the column is filled in with wood, appropriately strengthened with angle irons, and into which screws are driven to fasten the parts together. The wood piece, however, is not essential to the construction, for in some cases it is made of iron, and in some instances it is an integral part of the building to which the column is applied. The construction in many respects is a decided novelty, and will, no doubt, command the attention and interest of metal workers in general. It indicates in a marked degree the tendency in inventions and improvements in the general line of architectural sheet metal work at the present time.

AMONG THE MORE RECENT CONTRACTS of Charles Wuichet & Co., of Dayton, Ohio, they mention the sheet-metal work for the residence of Alexander Gebhart, of that city. This is to be done entirely in copper. They also have the contract for the church of the Sacred Heart, in Dayton. The roof and dome of this building are also to be done in copper. The dome is octagonal in shape, and measures 60 feet at the base. This firm report a very satisfactory business for the fall and think the prospect is excellent for the balance of the season.

WE LEARN FROM BAKEWELL & MULLINS, of Salem, Ohio, that they have been awarded the contract for all the sheet-metal work, including skylights and roofing, for the new hotel at Kansas City. Special interest centers in this undertaking, inasmuch as the hotel in question promises to be the largest between Chicago and San Francisco.

JUST AS WE GO to press the Architects' and Builders' edition of the catalogue of Willers's Inside Sliding Blinds for 1887-'88 reaches us. The book is oblong and contains 60 pages in addition to cover and blank forms for orders. The illustrations, some of which have already appeared in our columns, are very carefully made and show in an admirable manner the appearance of the work as arranged in different kinds of windows. The book is one that should be in every architect's collection. The address is William Willer, Fourth and Cedar streets, Milwaukee, Wis.

A NEW GLASS-CUTTING BOARD has been patented by Fred. Buck, of Cleveland, Ohio. The board is ruled in the conventional manner in squares, and along its upper edge there is a series of upright pins connected together by a top rail. The lower longitudinal edge of the board is provided with a series of horizontal pins also connected at their projecting extremities by a rail. The pins of the upper series have their longitudnal axis in the same respective planes with corresponding pins of the lower series. The pins are placed 1 inch apart. The cutting roller that is used with the board and which forms a part of the improvement, is provided at its upper edge with a transversely recessed lip. On the face of the roller adjacent to the lip are drawn a series of longitudinal gauge marks corresponding to the different fractional portions of an inch. A gauge is provided which has adjustable bearings on the lip, and is of a thickness so that its upper surface is flush with the upper surface of the roller. This gauge is provided with a transverse slot, in which is fitted an upright stud, rigid with the lip. A thumb-piece is threaded on the stud, so that its lower end may have a bearing on the adjustable gauge, clamping the latter at any desired point of lateral adjustment on the lip. From these general features it will be gained that the gauge is readily adjustable, so as to cut glass to any number of inches, or fractional portions of an inch, and that, too, in a way to make it very serviceable.

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